

The AUTOMOBILE

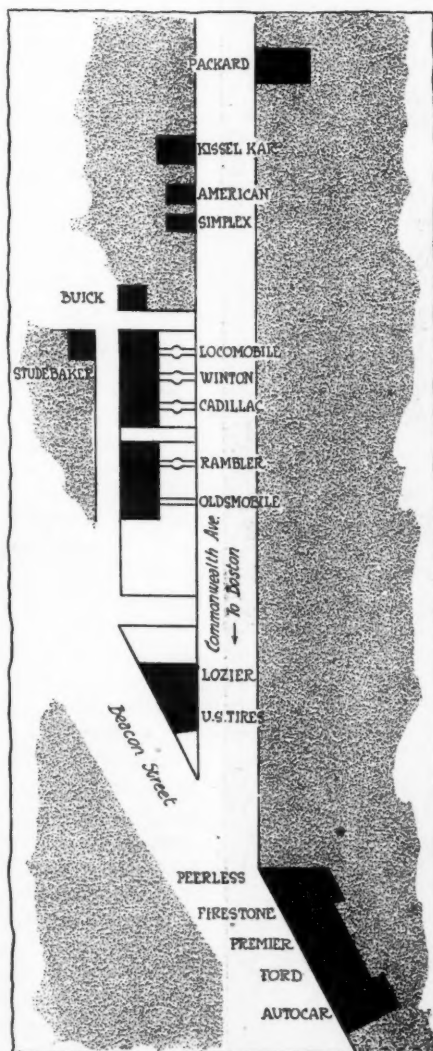
Service Plants for Boston Owners

The Hub Develops a Service District—New Buildings Represent Outlay of \$1,750,000

BOSTON, MASS., March 1—No city in the country is doing more real service for the users of motor cars than Boston. The dealers and branches in the Hub long ago realized that to keep the good will of the men who bought motor cars there should be something more than merely a place where an owner could go in with his car, have a few jugs of oil, gasoline, and water poured in; a bit of grease daubed here and there; and a rag run over the body, work that any man with no knowledge of motors or mechanics could do.

So they started building places that would make adequate service stations. As a matter of fact it is believed that the title "service station" or "depot," was coined in Boston by Alvan T. Fuller. In this connection also it may be said that the Packard agent brought out also the phrase "renewed cars." At any rate when he built his big building in the Back Bay—a structure that many believed was to be a mausoleum of his hopes because of its size, cost and distance from the city proper and which was called "Fuller's Folly"—he had put over the door "service depot" and insisted that this name be used in his publicity notices.

Since he migrated many others have followed suit. As a result you can look along Commonwealth avenue and Beacon street today and within half a dozen blocks see at one glance service stations whose total value is more than \$1,750,000. And if one were to look about and find the places in Cambridge where the Pope-Hartford, Stevens-Duryea, Chalmers, Hudson, Alco and others have buildings; the 6 acres of land just bought by the



Showing concentration of service stations in the Fenway district of Boston

Ford; the 150,000 square feet purchased for the Pierce-Arrow, the big shoe machinery building that was a colossal failure until turned over to motor service depots; the Bickerstaff street building; all these and a number of others scattered about the city it would total up several more millions. For the purpose of illustrating this article, however, it was decided to take the structures on a parallel line in the Fenway district all within a few blocks, as indicative of the vast growth, as the space of the article would not permit going into all details throughout the city. It shows, too, that the old order changes, for a few years ago no one ever dreamed of going out in the Fenway, more particularly for salesrooms. Yet thousands of feet of vacant land was available there needing only a pioneer, and once the threshold was crossed there followed the others.

Beginning at the extreme end with Mr. Fuller's Packard agency, that place represents an investment of about \$300,000 for property alone. If one includes the stock carried it will jump to half a million easily. This big four-story building running back a couple of hundred feet is a real monument to progress in the motor industry. Yet even now it is too small for the Packard business, so plans have been drawn for additional wings to take care of the increase.

Across the way on the right a short distance down is the new home of the Kissel-Kar for the makers decided that Commonwealth avenue was none too good for this purpose. It is a two-story structure at the corner of two streets with a great deal of light and space about it, and rep-



LOCOMOBILE, WINTON AND CADILLAC



PACKARD



STUDEBAKER



PEERLESS, PREMIER, FORD, AUTOCAR AND FIRESTONE TIRES

resents a value of land and buildings of about \$150,000. Some idea of its location may be gleaned when it is known that the White company, of Cleveland, after looking all over Boston and Cambridge for an available site has just purchased the lot beside the KisselKar for a new home, securing about an acre of land on which to erect a structure. Adjoining this is the home of the Marion and American, a one-story building running back some distance, also the new Simplex salesrooms and service depot. These two places represent more than \$100,000, and a similar amount or more is tied up in the building of the Columbia Tire & Tool Company and the Hume carriage building. While these are not service depots they are devoted to the motor industry.

Going down the avenue there looms up in the sky the name "Buick" before anything else is seen, the service depot of that make being located around the corner on Lawton street. Across the street stands the long structure housing the Locomobile, Winton and Cadillac, while in the rear is the Studebaker structure. The Buick building is a four-story structure that has been in use the last few years and this represents a valuation of \$65,000. That of the Studebaker is rated at \$48,000.

The home of the Locomobile, Winton and Cadillac is one of the striking buildings in the city setting back as it does so many feet. The Locomobile occupies the Western end, the Winton the center and the Cadillac has just taken the easterly section. This structure having two stories and basement is well lighted and admirable in every way. It is taxed for \$300,000. Excellent, too, are the Studebaker and Buick structures, although on a different plan because of the more restricted area.

Truck Industry Kept in Mind

Directly to the east of the Cadillac is the new home of the Thomas B. Jeffery company where are housed the Rambler cars. When it was built the Jeffery people had in mind the truck industry coming with its pleasure cars and so there is plenty room to take care of the latest Jeffery product. The Rambler has moved into its now home within a few months and it is not taxed yet, but it represents an outlay for land and buildings of perhaps \$200,000 or more. Joined on to the Rambler is the Oldsmobile branch. This, too, is a new home and one finds it quite complete although only half the length of the Rambler. This is a building that when taken in hand by the assessors next May will be rated with its land at more than \$100,000.

Standing in front of the Oldsmobile one can see the new building opened a week ago by the Lozier Motor Car Company, the Eastern end of which is occupied by the United States Tire Company. Here again the property values are high for it is at the junction of Beacon street and Commonwealth avenue and this will be another fine plum for the assessors to tax, the Lozier building alone being worth with its land well above \$100,000. The Paige-Detroit will be marketed there, too.

Directly across the street where Commonwealth avenue crosses Beacon street stands another of the big monuments to the industry in the handsome Peerless plant. This was erected a couple of years ago, and for some time like a sentinel it guarded the eastern end of the Fenway while the Packard stood guard at the western end. This structure is assessed for \$260,000. It seemed such a good investment for Governor Eugene N. Foss, of Massachusetts, who owns it, that he erected the Autocar building close by which is rated at \$170,000. And the demand came along for others and so the genial governor said to his architects and builders to keep up the good work and in between was added the Ford, Premier and Firestone tire building rated at \$115,000 and the handsome Peerless structure was no longer left alone.

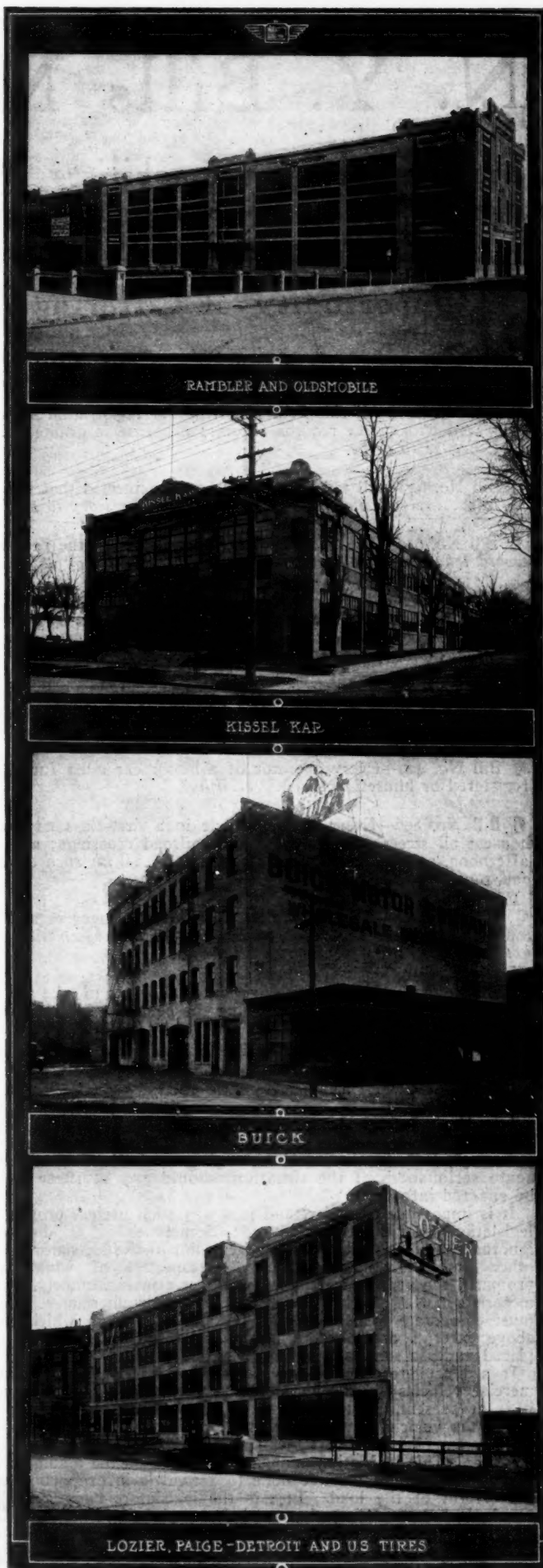
To get some idea of what it means to have motor structures in this vicinity it may be said that Beacon street, beginning at the State House, whose gilded dome looms up in the distance from any of these structures is the home of the real blue blood aristocracy of Boston along the stretches to the Peerless building. So, too, is Commonwealth avenue, said to be one of the

widest boulevards in America, and so laid out that it is included in the Boston Park system. As the city grew and homes were not to be had, apartments began to go up out in the Fenway where the motor structures are now rearing their heads. And looking back a decade one finds that the thought of business buildings in the Fenway was an abhorrent idea; one that would be scoffed at as unworthy of attention, while the owners of the land were not expecting to do any great developing for half a century. It was property that was eating its head off in taxes without a return even from letting billboards as a desecration.

Having erected service depots the men in charge have simplified matters in the way of giving real service these days. The Packard agency has such large facilities that it is possible to do more in the way of arranging for detail work in checking the car in and out than some of the other depots. For instance with four floors to work with more is needed than two, and so the matter of detail may be more comprehensive, but that does not necessarily mean that any better work is done than in some other places. For example, in the Packard building a car may go to the second, third and fourth floors for various requirements, while at the Locomobile it goes up one floor only. Therefore, it is not necessary to have such detail cards in the Locomobile branch as in the other. Manager Blake, of the Locomobile simplifies matters by passing out a blank on which is marked the work to be done, and this is sent to the owner for ratification before work is started. He reads it, and if agreeable he signs it so that there need be no dispute afterward on the charge. A time ticket stamps the car going in and out.

System at the Packard Station

In the Packard agency, when a car comes in a printed card is filled out giving the details of what is needed in the way of repairs. Then a long strip of tags are stamped, and the information card is put in a leather case and hung on the side. The tags are distributed to the workmen and whenever one man needs something or other he presents his duplicate tag and it is stamped and verified. A metal tag, not unlike a number plate, is hung on the car and a floor man coming along sees this and takes it to where it belongs, for a letter tells whether it is front or rear. The idea, like others, is to save time instead of having some one tell verbally or the floor man guess, where a car is going, and perhaps have a mixup of orders necessitating a car's being sent to the wrong floor. When the car is to be thoroughly overhauled it is stripped and every little thing on it is tabulated in duplicate and then put in a locker. The owner gets one of these check-up slips. If in but for a few days and the chauffeur is to work on the car on the lower floor—the only place a chauffeur or an owner is allowed—the robes, extra tires, etc., are checked just like baggage at a railroad station, and this eliminates any dispute about them, for they are locked in a separate closet. Everything is thoroughly systematized so that the car is sent along from one department to another, and when the work at one place is ended the man in charge of the department checks it off on the card while the tag of the workman is hung in a socket until the entire repairs are completed and all the tags are in place except one. This is the tester's tag, the last of all. He takes the car out and if he pronounces it O. K. it is stamped by the man at the office where the car first came in and the tag hung up on a board. Finally, a card is hung on the car that indicates it is ready for its owner, and he is notified to call for it. If he calls before the work is finished a telephone call to the department where the car is located will tell by a glance at the information card about how much longer the car will be in the shop. It is an extremely interesting system where no words are wasted; where men do things by reference to instructions before them; and where there can be no argument afterward because of the tabulations and checking up as the car proceeds from one department to another. Other service stations, too, have splendid systems, such as the Peerless, which was described in detail some time ago with a story on its new Boston branch.



N. Y. Bills Menace Motorists

Empire State Automobilists Dread Effects of Pernicious Legislation Threatened at Albany—Acts Would Mean Discrimination Against Private Owners and Members of Trade Without Opportunity of Offering Defense or Obtaining Hearing

¶ Bill No. 548—Every chauffeur must furnish to the Secretary of State a \$500 surety company bond.....*This means that all owners will be required to furnish such bonds for all of their chauffeurs.*

¶ Bill No. 649—All chauffeurs applying for registration must be photographed and have finger prints taken so that these may be compared with police records before the license is granted.....*This assumes that all chauffeurs are criminals before they get their license to drive.*

¶ Bill No. 649—All tail lights shall be so connected that the switch for operating them cannot be controlled from the inside of the car.....*With electric lights it would be necessary to stop the car, get out and operate a switch to light the tail lamps.*

¶ Bill No. 649—The Secretary of State shall have the power to revoke or suspend licenses with or without a hearing.....*This would take away from every owner any possibility of defense.*

¶ Bill No. 842—The owner of a motor vehicle is held liable for damages to persons or property and no defense to any action brought shall be that the vehicle was being operated by an unauthorized person.....*According to this, if your car is stolen and the thief in trying to escape kills a pedestrian or damages property, the car owner is liable and cannot use as a defense the argument that the thief was operating the vehicle.*

¶ Bill No. 567—The violation of a speed regulation by a motorist becomes a felony instead of a misdemeanor as at present.....*According to this any owner or driver who inadvertently exceeded the exact legal speed would be obliged to go to jail instead of paying a fine.*

¶ Bill No. 429—Every operator of a motor car must furnish a bond of \$2,000 with the Secretary of State before his car can be registered or himself licensed.....*Why?*

¶ Bill No. 896—Every motor vehicle in a first-class city with 1,000,000 inhabitants must come to a full stop in front of all fire houses; all street surface and steam railroad crossings; and all school houses, between 8 and 9 in the morning, 12 and 1 in the afternoon, and 3 and 4 in the afternoon.....*With such an ordinance street congestion would be such as to imperil human life and stagnate traffic.*

¶ Bill No. 1067—The registration fees for passenger cars shall be doubled and the fees for commercial vehicles shall be \$5 per ton load or fraction thereof.....*At present the registration fee for a commercial vehicle is \$5 per vehicle. At present there is not any registration fee for horse vehicles.*

¶ Bill No. 637—For an entire new automobile act to take the place of the present Callan law, which would include licensing motor cycles with automobiles and changing the penalties for violations of the law, etc.

¶ Bill No. 225—To increase the age limit for licensing chauffeurs from 18 to 21 years and reducing the registration fee from \$2.00 to \$1.00, at the same time making the owner liable for some of the fines which would be imposed on the chauffeurs under the act.

THESE excerpts from bills introduced into the New York State legislature show how motor-mad not a few of the legislators at Albany have become during the present session, and also give an indication of the acute seriousness of the situation, should any of these bills be enacted into laws.

It is impossible to understand just why such useless proposed legislation should be introduced: Sometimes it is due to ignorance, sometimes to a wrong viewpoint of the legislator, and other times for mere publicity. Irrespective of what has prompted the present legislators, one fact remains, namely, that motorists in New York State and owners of commercial vehicles must co-operate to combat many of the bills from which the above excerpts are taken, otherwise the Empire State will be placed under a serious handicap in automobiling.

It is difficult to conceive why the rate of registration on commercial vehicles should be increased from \$5 per vehicle, as it is at present, up to \$5 per ton, or fraction thereof, load, which the vehicle would carry. At present a 5-ton truck pays \$5 per year license, but under the new law it would pay \$25 per year. This legislation is apparently based on the assumption that the amount of damage done to a road is in proportion to the weight of the load. In this the legislators have entirely overlooked the one fact that road destruction is largely due to improper adhesion, such as skidding, which largely occurs at higher speeds than the 5-ton truck operates at.

Not infrequently the 1-ton truck damages the road as much as the 5-ton machine, because of the higher speeds at which it travels. The present proposed legislation assumes that road destruction is in direct proportion to load carried irrespective of width of tires, distribution of weight, etc.

If our legislators were to follow out the same policy in taxation in other avenues of life, it would mean that our school taxes would be graduated per family, according to the number of children attending school. That is, the property owner with a family of six would pay six times as much as the other owner having one child in attendance at school. Still further, it would mean that taxes for fire department service would be pro rated with those having fires, so that a concern having ten fires in the year would pay five times as much as another concern having two fires; and still further, concerns not having any fires would not be compelled to carry any of the burden. Amplifications of the peculiar operation of such a law could be carried much further.

In a word, the legislators are approaching the registration problem from an incorrect angle. Heavy horse wagons with narrow steel tires destroy the road. The calks in the horses' shoes destroy the road surface, forming little depressions in which the water collects. On the other hand, it has been proven in France and America that where special roadways intended for motor traffic have been created and horse traffic prohibited therefrom, that these roadways endured; whereas it is almost

impossible to furnish a suitable road surface which will withstand mixed traffic. Legislators should recognize the motor car as an established means of communication, and one superseding the horse in many departments of commerce, and as such it is imperative on them to build roads and legislate in all fairness to it. It is wrong to let the horse truck go license-free and increase the fees on motor trucks.

The motor vehicle is a new factor in individual and freight transportation; it is one of the dominant forces that sprang into prominence with the growth of this century; it is a factor that is going to increase from year to year until the end of the century and beyond; and it is because of the position it has taken in human existence and in the world of commerce that legislators must not try to surround it with horse vehicle environments and compel it to carry the burden that rightfully should be shared by horse vehicles.

Some of the legislators introducing these bills claimed to have been prompted by the number of accidents caused by commercial motor vehicles and also motor passenger vehicles. In view of this argument it can be cited that there are in New York but twenty-five motorcycle policemen and these are all in citizen's clothes. The best method of preventing accidents would be to install a motorcycle force of 100 uniformed policemen, and with such a force it is a conservative estimate that accidents would be reduced more than one-half in a month's time.

To-day there are plenty of regulations surrounding the operation of motor vehicles. What is wanted is a better enforcement of existing laws rather than a multiplication of them. Com-

PELLING a motor vehicle to stop in front of every fire house or every school will not eliminate accidents. Horse vehicles have been maiming as great a number in metropolitan centers as motor vehicles and yet legislators have not seen fit to even call for the registration of horse vehicles, much less horse drivers. Carelessness of pedestrians is to an enormous extent one of the leading causes of accidents. If, instead of trying to pass legislation compelling every motor vehicle to come to a full stop in front of a school, the legislations were aimed at placing a uniformed traffic policeman, or two if necessary, in front of each school house a better result would be obtained.

The passage of legislation as outlined in the excerpts already referred to would be a disgrace not only to the motoring interests of the State of New York but the entire electorate.

A hearing on this varied program of motor legislation is scheduled for Albany on March 13. Before that date every motorist should obtain the ear of his legislator and senator and see to it that he sees the motor vehicle in the position it at present plays in the development of transportation both passenger and freight. Each motor truck owner should register his influence against such legislation because of the dangerous situation it would create. Every dealer should co-operate in the movement to prohibit the passing of such bills. Makers of passenger cars and trucks should write their dealers in New York State; clubs should take up the opposition to these bills; and every business organization should do its part to see that unjust legislation such as this, unjust as it is to both maker and owner, is decisively defeated.

Dealers Organize To Meet Proposed Legal Measures

C. T. Terry Explains the Several Bills to Members of New York Association

AT a meeting of the Automobile Dealers' Association, Inc., at the Hotel Woodward, New York City, on February 26, the various automobile bills which have been introduced at the New York State Legislature at Albany at the opening of the present session were explained by Charles Thaddeus Terry. After going into the necessary detail, Mr. Terry explained why most of these bills if put into practice would be absolutely detrimental to the automobile industry and trade in the entire state. As has been reported repeatedly in *THE AUTOMOBILE*, the essence of the principal bills is that automobile registration fees be increased to two and a half times their present amounts and that the most rigid regulations be put in force against automobilists who were unfortunate enough to meet with mishaps on the road.

Among the interesting information brought out by Mr. Terry was the citation of a part of a bill which provides that whenever a chauffeur applies for a license the local police authorities may take his thumb prints with a view of comparing them to the records of the rogues' gallery, thus considering the automobile driver as a probable criminal from the beginning.

Another bill proposes that whenever an automobile owner is granted a license for driving his car he should file in the office of the secretary of state a bond amounting to \$2,000, to serve as a guarantee of his law-abiding demeanor. Out of this bond any injuries or damages shall be paid and if the owner should become guilty of a criminal offense this bond would serve as a means of calling him to the bar.

Still another and equally ingenuous scheme has been introduced by a state senator. It provides that every chauffeur before being licensed shall file a bond of \$500, guaranteed by a surety company; in other words, he must pay in advance for the possibility of an offense, an unprecedented course. Which, however, would no doubt prove of great advantage to surety companies.

What appears to be impudence Simon-pure constitutes the essence of a bill of considerable volume enumerating some twenty-five or thirty instances in which the secretary of state, at his discretion and without a hearing, may suspend or revoke a license granted to an automobile owner or driver. Such concentration of power in the hands of one man without any responsibility on his part to a body elected by the people is also an unheard-of innovation.

The following proposed measure should appeal to every thinking citizen:

Automobilists, when traveling through towns having 1,000,000 population or more, should bring their automobiles to full stop when passing a fire engine house, or a schoolhouse between 8 and 9 in the morning and 2 and 3 in the afternoon, excepting Sundays. The Solon who conceived this bill obviously forgot to make provision to except, in addition to Sundays, the seven National holidays which fall during the school season, as well as the 70 days of the summer during which the schools are closed in all cities. A first offense against this wise regulation, if the same be enacted, would cost an automobilist \$25, a second offense \$50 and a third \$100 or 30 days in prison or both.

Another good idea: Any person registering as the owner of an automobile shall be primarily liable for any injury to persons or damage to property caused by his automobile, no matter whether driven by himself, his agent, a member of his family or an individual not authorized by him. That is to say, if a man's car is stolen while the owner is inside a house and if the thief driving the car kills a person on the highway and the number of the automobile is noted by a passer-by, the owner may be indicted for murder, manslaughter or whatever name the bill proposes for such an offense.

One feeble light in this otherwise impenetrable night of thoughtlessness—to use no stronger word—is the proposition that every vehicle using the public highways should display, from 1 hour after sunset until 1 hour before sunrise, a light which is plainly visible in front of the vehicle and in the rear of the same. This proposed measure includes, of course, horse-driven vehicles of every description.

Mr. Terry made it clear that concerted action on the part of automobile manufacturers, dealers, accessory makers and jobbers, owners and chauffeurs is necessary to prevent such legislation from being enacted and to prevent also the registration fees from being raised 150 per cent. over what they were in 1912. The Automobile Dealers' Association is preparing a protest against all unreasonable legislation now pending and will conduct an efficient campaign, including posters, to be conspicuously displayed in business places of automobile and accessory dealers, etc.

Complete List of Exhibitors at Boston Show

More than 300 Makers of Cars and Accessories To Display Their Products
at New England's Representative Exposition

Anderson Electric Car Co. of Boston, Boston, Mass.	Goodrich Co., The B. F., Akron, Ohio	Nordyke & Marmon Co., Indianapolis, Ind.
Adams & Company, J. Q., Boston, Mass.	Goodyear Tire & Rubber Co., The, Akron, Ohio	Nyberg Automobile Works, Anderson, Ind.
Aetna Life Insurance Co., Boston, Mass.	Gray & Davis, Inc., Boston, Mass.	Oakland Motor Co., Boston, Mass.
Ajax-Grieb Rubber Co., New York City	Grady & Co., J. W., Worcester, Mass.	Oldsmobile Co. of Mass., Boston, Mass.
Allen Wrench & Tool Co., Providence, R. I.	Globe Wrench Co., Ipswich, Mass.	Orona Mfg. Co., Boston, Mass.
American Locomotive Co., Boston, Mass.	Habich Co., G. E. & H. J., Boston, Mass.	Packard Motor Car Co., Detroit, Mich.
American Storage Battery Co., Cambridge, Mass.	Harrington-Thompson Motor Cars, Inc., Boston, Mass.	Pantastote Co., The, New York City
Andrews-Dykeman Co., Boston, Mass.	Harris Oil Co., A. W., Providence, R. I.	Peerless Motor Car Co. of N. E., New York City
Arnold, N. B., Brooklyn, N. Y.	Hartford Suspension Co., Jersey City, N. J.	Paige-Detroit Motor Car Co., Detroit, Mich.
Automobile Supply Mfg. Co., Brooklyn, N. Y.	Havers Motor Car Co., Port Huron, Mich.	Pennsylvania Rubber Co., Jeannette, Pa.
Auto Parts Co., Providence, R. I.	Haynes Automobile Co., Kokomo, Ind.	Phila. Grease Mfg. Co., The, Boston, Mass.
Automobile Dealer & Repairer, New York City	Havoline Oil Co., New York City	Piel Co., The, Long Island, N. Y.
Am. Kusion Kone Tire Co., Inc., Buffalo, N. Y.	Haws, George A., New York City	Pierce-Arrow Motor Car Co., The, Buffalo, N. Y.
Armstrong & Curtis Co., Somerville, Mass.	Heinze Electric Co., Lowell, Mass.	Pittsfield Spark Coil Co., Dalton, Mass.
Abbott Motor Co., Detroit, Mich.	Henley-Kimball Co., The, Boston, Mass.	Pope Mfg. Co., The, Hartford, Conn.
American Motors Co., Indianapolis, Ind.	Hillman Auto Supply Mfg. Co., Boston, Mass.	Premier Motor Car Co. of N. E., Boston, Mass.
Albany Lubricating Co., New York City	Hoffecker Co., The, Boston, Mass.	Pyrene Co. of New England, Boston, Mass.
Bartlett, Edwin E., Boston, Mass.	Holden, George N., Boston, Mass.	Presto Inter Rim Co., Boston, Mass.
Bennett & Ricker Co., The, No. Cambridge, Mass.	Hollander Motor Co., Boston, Mass.	Peacock & Co., Clarence N., New York City
Bailey & Co., Inc., S. R., Boston, Mass.	Holtzer-Cabot Electric Co., The, Brookline, Mass.	Randall-Faichney Co., The, Jamaica Plain, Mass.
Batavia Rubber Co., The, Batavia, N. Y.	Homo Co. of America, Philadelphia, Pa.	Raymond Engineering Co., Inc., Boston, Mass.
Baum's Castorine Co., Rome, N. Y.	Holt & Beebe Co., Boston, Mass.	R. C. H. Corporation, Boston, Mass.
Bell, Bayers & Woodbury, Boston, Mass.	Hood Rubber Co., Watertown, Mass.	Reinhart, George W., Detroit, Mich.
Borland-Grannis Co., The, Chicago, Ill.	Hopewell Bros., Newton, Mass.	Regal Motor Car Co., Lansing, Mich.
Boston Tire & Rubber Co., Boston, Mass.	Hoyt Carburetor & Auto Co., Boston, Mass.	Reo Motor Car Co., Lansing, Mich.
Bowman Co., The, J. W., Fort Wayne, Ind.	Henderson Motor Car Co., Indianapolis, Ind.	Reliance Speedometer Co., Boston, Mass.
Bowser & Co., S. F., Boston, Mass.	Hudson Motor Car Co., Detroit, Mich.	Remy Electric Co., Anderson, Ind.
Boyd, F. Shirley, Boston, Mass.	Hupp Motor Car Co., Detroit, Mich.	Republic Motor Co. of Mass., Inc., Youngstown, Ohio
Boyd Motor Co., Boston, Mass.	Ideal Motor Car Co., Indianapolis, Ind.	R. & L. Co., The, Boston, Mass.
Buick Motor Co., Boston, Mass.	Imperial Automobile Co., Jackson, Mich.	Roberts-Sherburne, Inc., Boston, Mass.
Burn Boston Battery & Mfg. Works, Boston, Mass.	Ingersoll-Rand Co., New York City	Robinson & Son Co., Wm. C., Boston, Mass.
Bergdoll Motor Co. of Boston, Boston, Mass.	International Acheson Graphite Co., Niagara Falls, N. Y.	Rose, P. R., Boston, Mass.
Binney J. A., Detroit, Mich.	International Metal Polish Co., New York City	Russell Co., T. F., Boston, Mass.
Briggs-Detroit Co., Buffalo, N. Y.	Inter-State Automobile Co., Boston, Mass.	Russell Co., The W. L., Boston, Mass.
Buick Electric Vehicle Co., Cleveland, Mass.	Invader Oil Co., Boston, Mass.	Rose-Harvey Co., Boston, Mass.
Baker Motor Vehicle Co., Boston, Mass.	Jackson Motor Car Co., Boston, Mass.	Rauch & Lang Carriage Co., Cleveland, Ohio
Cadillac Automobile Co. of Boston, Boston, Mass.	Jeffery Co. of N. E., The Thos. B., Boston, Mass.	Salman, John A., Boston, Mass.
Catatract Rubber Co., The, Flint, Mich.	J. M. Shock Absorber Co., Inc., The, Philadelphia, Pa.	Sawyer Oil Co., Howard B., Boston, Mass.
Champion Ignition Co., Boston, Mass.	Jones Speedometer, The, Brooklyn, N. Y.	Schoen-Jackson Co., Media, Pa.
Chandler & Farquhar Co., Rumford, Maine.	K. D. Motor Co., Brookline, Mass.	Seamless Rubber Co., The, Boston, Mass.
Clark Foundry Co., Jackson, Mich.	Kelleher, J. J., Dorchester, Mass.	Shannon, T. R., Hartford, Conn.
Clark, Carter Auto Co., Worcester, Mass.	Keystone Lubricating Co., Boston, Mass.	Shaler Co., C. A., Wapum, Wis.
Coe's Wrench Co., New York City	Kilham, J. F., Beverly, Mass.	S. G. V. Co., Reading, Pa.
Columbia Lubricants Co. of N. Y., New York City	Koheler Sporting Goods Co., H. J., Boston, Mass.	Simms Magneto Co., The, New York City
Columbia Tire & Tap Co., Boston, Mass.	Knox Automobile Co., Springfield, Mass.	Smith, Fred S., Boston, Mass.
Connecticut Tel. & Elec. Co., Meriden, Conn.	Krit Motor Car Co., Detroit, Mich.	Splitdorf Electrical Co., Newark, N. J.
Connell & McKone Co., New York City	Kelly-Springfield Tire Co., New York City	Standard Auto Supply Co., Boston, Mass.
Consolidated Rubber Tire Co., New York City	Lapoint Co., The, J. N., New London, Conn.	Standard Thermometer Co., Boston, Mass.
Cook's Sons, Adam, Boston, Mass.	Lawrence & Stanley Co., Boston, Mass.	Standard Tire & Rubber Co., Boston, Mass.
Coward Auto Supply Co., Philadelphia, Pa.	Leather Tire Goods Co., Niagara Falls, N. Y.	Standard Welding Co., The, Cleveland, Ohio
Cramp & Sons Ship & Engine Bldg. Co., Philadelphia, Pa.	Lee Tire & Rubber Co., Conshohocken, Pa.	Standard Woven Fabric Co., Worcester, Mass.
C. R. G. Mfg. Co., Saugus, Mass.	Lenox Motor Car Co., Inc., The, Boston, Mass.	Stanley Motor Carriage Co., Newton, Mass.
Crowell Chemical Co., Beverly, Mass.	Lewis, C. B., Cambridge, Mass.	Stevens-Duryea Co., Chicopee Falls, Mass.
Curtis-Hawkins Co., The, Boston, Mass.	Linscott Motor Co., Boston, Mass.	Stearns Co., The F. B., Cleveland, Ohio
Case Threshing Machine Co., J. I., Boston, Mich.	Linscott Supply Co., Boston, Mass.	Steel Specialties Co., Boston, Mass.
Cutting Motor Car Co., Indianapolis, Ind.	Little Motor Car Co., Flint, Mich.	Stevens, W. H., Boston, Mass.
Cole Motor Car Co., Hartford, Conn.	Locomobile Co. of America, The, Boston, Mass.	Stewart & Clark Mfg. Co., Chicago, Ill.
Columbia Motor Car Co., Detroit, Mich.	Loehler Die Casting Co., Brooklyn, N. Y.	Stromberg Motor Devices Co., Chicago, Ill.
Chevrolet Motor Co., Detroit, Mich.	Lovell-McConnell Mfg. Co., Newark, N. J.	Stutz Motor Car Co., Boston, Mass.
Chalmers Motor Co., Columbus, Ohio	Lozier Motor Co. of N. E., Boston, Mass.	Speedwell Motor Car Co., Dayton, Ohio
Columbus Buggy Co., Dayton, Ohio	Lunt Moss Co., Boston, Mass.	Swinehart Tire & Rubber Co., The, Akron, Ohio
Dayton Motor Car Co., Boston, Mass.	Laidlaw, Wm. R., Jr., New York City	Texas Co., The, New York City
Dayton Airless Tire Co., The, Boston, Mass.	Marathon Motor Works, Nashville, Tenn.	Tobey, Wm. L., Boston, Mass.
Daniels, Smalley, Elyria, Ohio	Maxwell-Briseoe Motor Co., Auburn, R. I.	Townsend & Co., S. P., Orange, N. J.
Dean Electric Co., The, Akron, Ohio	McCue Co., The, Buffalo, N. Y.	Tyer Rubber Co., Andover, Mass.
Diamond Rubber Co., The, Boston, Mass.	MacAlman, J. H., Boston, Mass.	Tyler Bros. Corp., Boston, Mass.
Dodge Motor Vehicle Co., Cambridge, Mass.	MacDonald, Donald N., Boston, Mass.	Underhay Oil Co., Boston, Mass.
Double Fabric Tire Co., Auburn, Ind.	Maguire Co., The, J. W., Boston, Mass.	Underhill Co., The, Boston, Mass.
Dover Stamping Mfg. Co., Cambridge, Mass.	Marburg Bros. Inc., New York City	United Motor Boston Co., Boston, Mass.
Dutton Motor Co., Inc., F. A., Boston, Mass.	Meyers Bros., New York City	United Rim Co., The, Akron, Ohio
Donovan Motor Car Co., Boston, Mass.	Metz Co., Waltham, Mass.	U. S. Light & Heating Co., The, New York City
Davis Carriage Co., Geo. W., Richmond, Ind.	McFarlan Motor Car Co., Connorsville, Ind.	United States Tire Co., Boston, Mass.
Dunn Ray Co., Boston, Mass.	Mercer Automobile Co., Trenton, N. J.	Vacuum Oil Co., New York City
Eagle Oil & Supply Co., Boston, Mass.	Michigan Tire Co. of Mass., Kalamazoo, Mich.	Valentine & Co., New York City
Eaton & Sons, Inc., J., Camden, N. J.	Middleboro Auto Exchange, Middleboro, Mass.	Veeder Mfg. Co., The, Hartford, Conn.
Edison Storage Battery Co., W. Orange, N. J.	Mitchell Lewis Motor Co., Racine, Wis.	Vellie Motor Vehicle Co., Boston, Mass.
Eisner-Lenk Co., The, Boston, Mass.	Miller, Chas. E., New York City	Vesta Accumulator Co., Chicago, Ill.
Electric Storage Battery Co., The, Philadelphia, Pa.	Moore Smith Co., Boston, Mass.	Voorhees Rubber Mfg. Co., Jersey City, N. J.
Empire Rubber & Tire Co., Trenton, N. J.	Morrison-Ricker Mfg. Co., Grinnell, Iowa	Walker Lithograph & Pub. Co., Boston, Mass.
Endurance Tire & Rubber Co., New York City	Moon Motor Car Co., St. Louis, Mo.	Walpole Tire & Rubber Co., Boston, Mass.
Elliott Motor Engine Co., Waltham, Mass.	Morse & Co., Alfred Cutler, Boston, Mass.	Ward & Sons, Edgar T., Boston, Mass.
Ernsdale Worsted Co., Clinton, Mass.	Mossberg Co., Frank, Attleboro, Mass.	Waverly Co., The, Indianapolis, Ind.
Fairbanks Co., The, Boston, Mass.	Motor Parts Co., Philadelphia, Pa.	Warner Instrument Co., The, Beloit, Wis.
Federal Rubber Mfg. Co., Cudahy, Wis.	Motor Vehicle Pub. Co., New York City	Weed Chain Tire Grip Co., Boston, Mass.
Fiat Motor Sales Co., Boston, Mass.	Motor & Accessory Mfrs., New York City	White & Bagley Co., The, Worcester, Mass.
Firestone Tire & Rubber Co., Akron, Ohio	Motz Tire & Rubber Co., The, Akron, Ohio	Whitten-Gilmore Co., The, Boston, Mass.
Firestone-Columbus Buggy Co., Columbus, Ohio	Moyer, H. A., Syracuse, N. Y.	Willard Storage Battery Co., The, Cleveland, Ohio
Fisk Rubber Co., The, Chicopee Falls, Mass.	Motor Car Mfg. Co., Boston, Mass.	Wing Motor Car Co., F. E., Boston, Mass.
Flentje, Ernst, Cambridge, Mass.	MacDonnell, Webster, Haverhill, Mass.	Winship, W. W., Boston, Mass.
Forbes, Walter J., Boston, Mass.	National Tube Co., Pittsburg, Pa.	Winton Motor Car Co., The, Boston, Mass.
Ford Motor Co., Boston, Mass.	Neale, A. F., Boston, Mass.	Willis-Overland Co., Toledo, Ohio
Franklin Motor Car Co., Boston, Mass.	National Motor Vehicle Co., Indianapolis, Ind.	Wolverine Lubricant Co., Boston, Mass.
Fuller, Alvan T., Boston, Mass.	New Departure Mfg. Co., The, Bristol, Conn.	Wayne Oil Tank & Pump Co., Boston, Mass.
Ford Co., Percy, Boston, Mass.	N. Y. & N. J. Lubricant Co., New York City	Westcott Motors Co., Boston, Mass.
Gabriel Horn Mfg. Co., Cleveland, Ohio	Norton Co., Worcester, Mass.	Williams & Co., Chicago, Ill.
Garford Co., The, Elyria, Mich.	New England Motorcycle Co., Boston, Mass.	Woods Motor Vehicle Co., Chicago, Ill.
Grinnell Electric Car Co., Detroit, Mich.		White, Harry C., Boston, Mass.
Gibney Rubber Co., James L., Philadelphia, Pa.		

Desperados Fail To Win Tire Strike

Imported Agitators Merely Prolong Trouble for a Period of 7 Days—Loss Estimated at \$50,000,000

AKRON, O., March 4—(Special Telegram)—Imported agitators into Akron, many being among the most desperate characters in the country, have been the means of prolonging the strike among the rubber workers here for another week.

A week ago the strike was broken and there was a great rush on the part of the thousands of men and women to get back to work. Then came the imported strike leaders and sensational demands by one of the local newspapers for a state senatorial investigation of the rubber factories here and the conditions leading up to the strike.

The senatorial committee has been in session here 3 days. All sessions are being held at the Portage Hotel and are open to the public. Many of the strikers, members of the I. W. W., have related their alleged grievances. The testimony from the men has demonstrated the fact that higher wages are paid in Akron rubber factories than in any other similar factories in the country. Many of the common laborers have testified that they received from \$3.50 to \$5 a day. None of the testimony from the strikers was substantiated, the charges made by the strikers being that they were poorly paid and mistreated. In the meantime one of the Socialist editors, a leader in the strike, has been arrested for inciting a riot and has been sent to the workhouse.

Two desperate characters have been fined and imprisoned for carrying red flags through the streets and many other imported strike leaders have been arrested. Announcement was made tonight that "Big Bill" Haywood will arrive in the city to try and pull together the remnants of the I. W. W. that has fallen to pieces. The chairman of the I. W. W. executive committee resigned tonight and threatens to make sensational exposures of the I. W. W. later. All of the sessions of the state probe committee are being daily attended by head officials of the local rubber companies. Frank A. Seiberling, president of Goodyear Tire & Rubber Company, was the first of the manufacturers to appear before the state probe committee this afternoon. Seiberling has furnished committee with every possible information. He testified today that out of 21,500 people employed in Akron Rubber factories there are now 11,700 at work and hundreds returning daily. Every plant in city is fast resuming normal conditions. Local rubber manufacturers say that they will never recognize the I. W. W. Estimates were made today that over \$50,000,000 have been lost to stockholders and the city as result of strike. Saloons, which have been closed over a week in the city, were opened again today. The parades which were features of the strike a week ago have been called off. Interest is centered on the coming of Haywood. Police are prepared to arrest Haywood when he comes. The senate probe committee is disgusted with the probe and has said that Akron rubber factories are the best in the country.

Hartford Maxwell to Build Six

HARTFORD, CONN., March 4—The Maxwell Motor Company, Inc., successor to the Columbia Motor Car Company, continues to increase its manufacturing force and is hiring men every day, a great majority being the old workmen who have been with the company for years. The company is also installing considerable new machinery, and has in transit a carload of such with more to follow in a few weeks. The policy is to continue adding to the equipment as fast as required and to replace much of the old machinery with the latest types.

The company is going to confine its efforts to the Knight sleeve-valve motor and in addition to its four-cylinder model expects to market a six-cylinder one sometime in June. This six, using cylinders cast in threes, will have a bore of 4.5 inches, a stroke of 4.5 inches, and a 139-inch wheelbase. It is the purpose to completely equip this model with all accessories necessary for transcontinental travel, including an electric lighting and starting system. The car will list touring car bodies at \$5,000.

The company expects to also market Knight-motored cars of smaller motor sizes and to be sold at correspondingly lower prices than those listed at present. The entire product of this company will be handled by a separate list of dealers from those handling the other products of the Maxwell Motor Company, Inc., and it is planned to have a separate selling organization with headquarters at the Hartford plant.

Hartford Tire Men Convene

HARTFORD, CONN., March 1—Forty-six service department heads of the United States Tire Company met at the Hartford Rubber Works plant this week for a 3-day session. The attending service managers are from the various branches throughout the eastern district. The object of the meeting was to discuss service in relation to the tire user. Talks were given by officials of the company. The local plant was inspected. The service department of the United States Tire Company has assumed large proportions within the past year.

Chalmers to Issue \$1,500,000 in Stock

DETROIT, MICH., March 1—The Chalmers Motor Company plans to issue \$1,500,000 in 7 per cent. preferred stock at a meeting of the stockholders to be held the middle of the month. The proceeds from the issue are to be used merely as a reserve fund for protection against contingencies, and not to pay off any existing obligations as was stated in some quarters.

Sixty-five representatives of banking institutions in various parts of the country inspected the factory today to ascertain whether they could handle the issue. As their opinion was favorable, there is no doubt that the issue will be formally authorized at the coming stockholders' meeting. Although a meeting of the stockholders was held today, the matter of the issue was merely brought before it, no definite action being taken at this time.

Court Upholds Consolidated Rubber Co.

On March 3, Judge Cox, of the U. S. District Court, Southern District of New York, rendered a decision in favor of the Consolidated Rubber Tire Company, and the Rubber Tire Wheel Company, against the Diamond Tire Company, of New York, the Diamond Tire Company of Ohio, the Diamond Tire Company of West Virginia, the B. F. Goodrich Company, of New York, A. H. Marks, W. B. Miller and G. Work, to restrain the defendants from disposing of a quantity of tires, held by them which constitutes an infringement under the Grant patent, which expired February 18. The complainant also has a decision authorizing him to have destroyed the stock which is held by these companies, and also the Kokomo Tire Company, of Indiana. There is a suit now against the Diamond Rubber Company, in the U. S. District Court, Northern District of Ohio.

Detroit Is Short of Cars

Branch Office of N. A. A. M. Doing Good Work in Securing Cars for Use of Automobile Manufacturers

Members of the Trade Rendering Excellent Co-operation in Securing Data Covering Needs of Transportation

DETROIT, MICH., March 3—Since its establishment by the National Association of Automobile Manufacturers at the convention held in this city last fall, the Detroit office of the Association's traffic department has played an important part in the shipments of motor cars from this city and the return of the empty freight cars. During January the office was concerned in the shipment of between 5,000 and 6,000 carloads of automobiles. Figuring that each of these cars averaged four machines, the total shipment of automobiles from this city during January was somewhere between 20,000 and 24,000. These figures are conservative as some of the freight cars contained as high as eight machines. On the other hand, some of them carried only three.

According to J. A. Gardner, manager of the Detroit office, the greatest work of his department lies in the securing of the return of the special automobile box cars to this city for reloading after they have reached their destinations. The automobile industry is handicapped so far as its freight cars is concerned, since shippers of many other lines of merchandise can make use of the automobile cars equally as well, if not better, than they can the regulation box cars with side doors. On the other hand the motor car maker can use only the specially constructed cars. As a consequence, it keeps the traffic bureau busy tracing the special cars and preventing them from being purloined before they can be returned for further service to the automobile makers.

The Detroit traffic office is working to great advantage to the automobile makers. Mr. Gardner states that there has really been little or no car famine here this winter, although off and on there has been somewhat of a shortage. With the increasing shipments of spring goods in all lines there is beginning to be a slight curtailment of the freight car supply, although the bureau does not look for any great shortage.

Lyons-Knight To Build Cars

INDIANAPOLIS, IND., March 5—The Lyons Atlas Company, one of the four American Knight licenses, and which heretofore has confined itself to building the Lyons-Knight motors, has decided to embark into the car manufacturing field as well. This comes out in the announcement made today that the Lyons-Atlas people have purchased the sample cars, parts, drawings and patterns of the Knight engined cars which were designed and developed during the last 18 months by Harry A. Knox, of Springfield, Mass. Mr. Knox and his draughtsmen have been brought on from the East and already have been given quarters in the local plant and the new car will be brought out under the direction of Mr. Knox. Both sixes and fours will be built and the car will be featured by a worm-drive axle, left steer, center control, electric starter, electric lighting equipment and gasoline tank on the dash. The transmission is embodied in the rear-axle housing. Deliveries will begin in 6 weeks.

Knox Liability Schedule Filed

SPRINGFIELD, MASS., March 1—The schedule of liabilities filed this week in the United States District Court at Boston by Albert E. Smith, treasurer of the Knox Automobile Co., which

assigned on September 27 last for the benefit of its creditors, shows but two secured creditors. The total liabilities are put at \$1,286,409 and the assets at \$1,380,386. There are more than 500 unsecured creditors. Here are the larger ones, some of them being well-known firms in the motor industry, makers of tires and parts:

Estate of Alfred N. Mayo, Edward O. Sutton, Harry G. Fiske and W. T. Schell, administrators. Promissory notes for money loaned, with interest.....	\$926,500	W. J. Kells Mfg. Co., New York	\$3,792
First National Bank, Boston	40,000	E. R. Merrill Spring Co., New York	4,316
Chicopee National Bank, Chicopee	30,000	Merrimac Paper Co., Lawrence	1,195
National Exchange Bank, Hartford	6,000	Millbury Steel Foundry, Millbury	3,359
Keely-Springfield Tire Co., New York	3,756	New Haven Carriage Co., New Haven	2,828
W. E. Wright, Springfield, salary	1,775	Ross Gear & Tool Co., Lafayette, Ind.	2,434
Cape Ann Tool Co., Pigeon Cove	3,007	A. O. Smith Co., Milwaukee, Wis.	7,002
Fisk Rubber Co., Chicopee Falls	80,473	Spring Perch Co., Bridgeport, Conn.	5,482
W. F. Galle & Co., Cincinnati	5,025	Standard Oil Co., New York	2,300
Goodyear Tire & Rubber Co., Akron, O.	5,813	Timken Detroit Axle Co., Detroit	4,959
		Wyman & Gordon Co., Worcester	2,594
		English & Mersick Co., New Haven, Conn.	6,196

The assets of \$1,380,386 consist of incumbered real estate valued at \$268,300, the estimated value of the patents and stock in trade put down at \$750,000 and the estimated value of the machinery, fixtures, tools, etc., used in the manufacture of automobiles.

INDIANAPOLIS, IND., March 3—Judge Albert B. Anderson, of the United States District Court, has denied a petition filed some time ago by Indiana creditors asking that the Maxwell-Briscoe Motor Company, which had a plant at Newcastle, now owned by

Automobile Securities Quotations

As was to be expected, the much reduced tension obtaining at Akron caused a fairly general restitution of old prices of tire stocks during this week, Firestone common advancing 25, Goodyear common 25, Miller 35, Swinehart 7 and U. S. Rubber 4. Fisk preferred was the only tire issue which sold down, and the loss of 2 points appeared to be insignificant in every respect. Automobile manufacturing securities, including Chalmers, General Motors, Studebaker and Willys-Overland also scored advances.

	1912	1913
Bid	Asked	Bid Asked
Ajax-Grieb Rubber Co., com.....	..	150 175
Ajax-Grieb Rubber Co., pfd.....	..	95 99
Aluminum Castings, pfd.....	..	99 101
American Locomotive Co., com.....	33 1/2	36 1/4 37
American Locomotive Co., pfd.....	105 1/2	104 1/2 105 1/2
Chalmers Motor Company.....	..	135 145
Consolidated Rubber Tire Co., com.....	10	20 25
Consolidated Rubber Tire Co., pfd.....	25	40 83
Firestone Tire & Rubber Co., com.....	205	290 305
Firestone Tire & Rubber Co., pfd.....	110	102 104
Garford Company, preferred.....	..	98 100
General Motors Company, com.....	31	32 31
General Motors Company, pfd.....	75	76 77
B. F. Goodrich Company, com.....	..	43 43 1/2
B. F. Goodrich Company, pfd.....	..	99 100
Goodyear Tire & Rubber Co., com.....	338	342 390
Goodyear Tire & Rubber Co., pfd.....	110	102 104
Hayes Manufacturing Company.....	..	90 90
International Motor Co., com.....	..	5 15
International Motor Co., pfd.....	..	35 55
Lozier Motor Company.....	..	27 30
Miller Rubber Company.....	..	186 190
Packard Motor Company.....	104	107 102
Peerless Motor Company.....	..	120 125
Pope Manufacturing Co., com.....	40	43 50
Pope Manufacturing Co., pfd.....	74	77 75
Reo Motor Truck Company.....	8	10 11 1/2
Reo Motor Car Company.....	23 1/2	25 20 1/2
Rubber Goods Mfg. Co., pfd.....	100	105 104
Studebaker Company, com.....	..	31 32 1/2
Studebaker Company, pfd.....	..	88 93
Swinehart Tire Company.....	..	95 102
U. S. Motor Co., com.....	..	35 65
U. S. Motor Co., 1st pfd.....	..	.. 63 1/2
U. S. Motor Co., 2nd pfd.....	..	.. 106
U. S. Rubber Co., com.....	46	47 105 1/2
U. S. Rubber Co., 1st pfd.....	110	110 1/2 105 1/2
White Company, preferred.....	..	103 107
Willys-Overland Company, com.....	..	64 69
Willys-Overland Company, pfd.....	..	93 97
Fisk Rubber Co., com.....	..	100 104
Fisk Rubber Co., pfd.....	..	.. 104

the Maxwell Motor Co., be adjudged bankrupt. He has also dissolved an order restraining the removal of any property from the Newcastle plant or from the jurisdiction of the court. It was shown in court that the petitioners had assigned their claims, which have since been satisfied, to Henry V. Poor and that the court had no jurisdiction in the matter.

There was an absence of new developments of importance in the crude rubber situation yesterday. Trading in the leading markets of the world continued sluggish so far as the consuming demand was concerned. Manufacturers in some cases are believed to be carrying small supplies, but they seem to be sufficient for their needs, and few in the trade expect to witness any increase in the demand in the near future. Here in New York the market was devoid of new features of interest. The attitude of both the buyer and the seller seems to be a waiting one. Up-river fine was calling at \$95.

BUFFALO, N. Y., March 5—The entire plant of the Thomas company will be sold at an unrestricted sale covering the dates of March 17 to 22 inclusive. The sale will be handled by J. E. Conant & Company on the premises.

NEW YORK CITY, March 5—As reported exclusively in THE AUTOMOBILE of last week, the Merchants' Association, of New York has been studying the automobile situation with a view of bringing the industry to this city. The results of this study have been so promising that the industrial committee has now definitely decided to take vigorous steps to interest both new and old manufacturers.

Market Changes of the Week

Tin proved to be the most important change in the markets this week, gaining \$15 per hundred pounds. Starting on Wednesday at \$47.75, it fluctuated sometimes \$.25 below Wednesday's price, but pulled itself up to \$47.90 on Tuesday. An easier tone was developed in refined copper yesterday, with less buying of electrolytic in Europe and fewer orders from domestic consumers, but prices were without essential changes, electrolytic and Lake rising \$.00 1-4 and \$.00 1-8 per pound, respectively. Linseed remained quiet but steady, although going a drop of \$.03 on Saturday. Lead remained constant at \$4.30 per hundred pounds. Cottonseed oil trading on the local market yesterday was of rather insignificant volume. Price changes were also unimportant. Offering of crude were not large, but there was no demand from refiners. The consuming demand continues light. It experienced a gain of \$.05 per barrel. Forcing scrap rubber remains in a firm position.

Material	Wed.	Thurs.	Fri.	Sat.	Mon.	Tues.	Week's Change
Antimony, lb.....	.08¼	.08¼	.08¼	.08¼	.08¼	.08¼	.....
Beams & Channels, 100 lbs.....	1.61	1.61	1.61	1.61	1.61	1.61	.....
Bessemer Steel, ton.....	29.00	29.00	29.00	29.00	29.00	29.00	.....
Copper Elec., lb.....	.14¾	.14¾	.14¾	.14¾	.14¾	.14¾	+.00¼
Copper, Lake, lb.....	.14¾	.14¾	.14¾	.14¾	.14¾	.14¾	+.00¼
Cottonseed Oil, bbl.....	6.30	6.36	6.36	6.36	6.37	6.35	+.05
Cyanide Potash, lb.....	.19	.19	.19	.19	.19	.19	.....
Fish Oil, Menhaden, Brown.....	.33	.33	.33	.33	.33	.33	.....
Gasoline, Auto, 200 gals.....	.22¼	.22¼	.22¼	.22¼	.22¼	.22¼	.....
Lard Oil, prime.....	.90	.90	.90	.90	.90	.90	.....
Lead, 100 lb.....	4.30	4.30	4.30	4.30	4.30	4.30	.....
Linseed Oil.....	.50	.50	.50	.47	.47	.47	-.03
Open-Hearth Steel, ton.....	29.00	29.00	29.00	29.00	29.00	29.00	.....
Petroleum, bbl., Kansas crude.....	.88	.88	.88	.88	.88	.88	.....
Petroleum, bbl., Pa., crude.....	2.50	2.50	2.50	2.50	2.50	2.50	.....
Rapeseed Oil, refined.....	.68	.68	.68	.68	.68	.68	.....
Silk, raw Italy.....	4.30	.....	.....	.....	4.30	4.30	.....
Silk, raw Japan.....	3.70	.....	.....	.....	3.70	3.68	-.02
Sulphuric Acid, 60 Beaumé.....	.90	.90	.90	.90	.90	.90	.....
Tin, 100 lb.....	47.75	47.50	47.57	47.60	47.80	47.90	+.15
Tire Scrap.....	.09¾	.09¾	.09¾	.09¾	.09¾	.09¾	.....

International Co. Report

Earnings for the Year Amount to \$590,149 After Deducting All Operating and \$222,850 for Buying Machinery

Investigations Made by Committee Which Reports Conditions Highly Favorable for Sale of Trucks Next Year

NEW YORK, March 4—The annual report of the International Motor Company for the year ending December 31, 1912, shows a net earning of \$590,149, and in a letter President C. P. Coleman of the company addressed to stockholders, he states that orders for the past year have increased 95 per cent. in quantity and 96.6 per cent. in value; and the shipments during the year show an increase of 78 1-3 per cent. in quantity and 72.6 per cent. in value.

At the end of the fiscal year the balance available for dividends was \$499,048 equal to 7 per cent. on the preferred stock and an additional 4.39 per cent. on the common. The income account for the year including subsidiaries:

Net earnings after deducting all expenses and depreciation.....	\$590,149
Interest	91,101
Surplus	\$499,048
Preferred dividends (three).....	185,260
Balance	\$313,788
Special and extraordinary charges.....	117,151
Surplus	\$196,637

In his report on the business of the year, President Coleman says: "At the end of the year there were remaining on hand unfilled orders amounting to \$712,243 in sales value. During January, 1913, the company's sales approximated \$250,000, or twice the amount of the same month in 1912.

"It has been necessary during the past year to assimilate and rearrange the several organizations taken over so as to produce one working as a whole. This has been, in a large measure, accomplished, and we close the year with an organization very much strengthened. The effect of this will be felt even more strongly during the coming year.

"In Greater New York there are now in service approximately 1,200 of our trucks.

"Owing to the increase of 95 per cent. in our orders during the past year, and the rapid growth of the motor truck industry, additions were made to our Mack plant at Allentown, Pa., and to our Saurer plant at Plainfield, N. J., for buildings, machinery and shop equipment representing an outlay of \$222,850.

"You will note that, although this is our first year, when it was necessary to incur the expenses incidental to an organization period, the net earnings for the year, after writing off liberal amounts in connection with the organization and acquisition of the component companies, are largely in excess of the requirements of 7 per cent. on the outstanding preferred shares.

"The growth of the business and the necessity of carrying out certain contracts for materials made by our predecessors materially increased our investment in inventories and necessitated additional cash. This was accomplished in accordance with the plan of which you are advised by our letter of December 12, 1912.

"Your board of directors felt that because of these requirements, and for the development of the company's business, it was advisable to waive payment of preferred dividends, this action being taken after consultation with the holders of a large majority of the stock, who gave their approval.

"We have recently made a very careful canvass of the general market situation for motor trucks, through our own organization and otherwise, with the result that we feel warranted in concluding that the demand for motor trucks will be largely in excess this coming year over that of the previous one."

S. A. E. Talks Kerosene

Bennett's Experiments on Coal Oil Produced Results—Legislation Is Mentioned

Committee on Rims Named

NEW YORK CITY, Feb. 28—Kerosene and the kerosene carbureter were the subjects of discussion at a meeting of the Metropolitan Section of the Society of Automobile Engineers last night, where A. C. Bennett, of the Wilcox-Bennett Carbureter Company, Minneapolis, was the principal speaker.

In his address to the members Mr. Bennett gave many interesting particulars of practical experiments he has recently conducted with a view to evolving a satisfactory carbureter for the heavier fuel. The commercial possibilities of such a carbureter are generally recognized. With the increasing price of gasoline its introduction at an early date is becoming almost a necessity.

The greatest difficulty encountered in an attempt to use kerosene as a fuel in explosion motors, Mr. Bennett pointed out, was that of breaking up the fluid into sufficiently fine particles before entering the cylinder. There is a considerable difference in this respect between the operation of gasoline and kerosene. In the first vaporization takes place immediately after leaving the carbureter, whereas in the case of kerosene the fuel is in a state of spray throughout the inlet passages and until its entry into the cylinder. The real problem, therefore, is to devise a means of reducing the fluid to the finest possible particles, and in order to do this, Mr. Bennett found that a high velocity of inlet flow was desirable. This was accomplished by using a much smaller manifold than is general practice with gasoline engines, and also by opening the inlet valve late so that the partial vacuum created would induce a faster flow through the carbureter jets and manifold passages. Easy curves in the manifold are of no benefit. In fact, in the experiments in question fins were introduced for the express purpose of making the passages more difficult so that the breaking up of the fuel was more thorough. A multiple-jet carbureter was used and the kerosene before entering was heated. The air, on the other hand, was allowed to be drawn in cold. Water was then added in small quantities from a hand-controlled jet. It was found that the necessity of adding water varied according to the design of engine. Without it preignition is liable to occur in most engines. The compression was not altered for the kerosene experiments. But it was found necessary to provide more clearance for the piston owing to the greater heat encountered by its upper surface.

Little Trouble with Carbon

The question of carbon deposit was dealt with by Mr. Bennett. Results showed that with a careful choice of good lubricating oil and the correct positioning of the spark-plugs very little of the trouble usually associated with the word kerosene was experienced. An important point, however, is that the spark-plugs be not pocketed, but located in such a position that the points are swept by the gases. The points themselves should be of fine wire, arranged so as to minimize the accumulation of carbon as clean plug-points are absolutely essential.

In conclusion, Mr. Bennett expressed his belief in kerosene as a solution of the impending shortage of gasoline for pleasure car purposes by utilizing it as a fuel for all stationary and truck motors. A short discussion followed in which various members of the society took part.

Another matter decided at the meeting, on the suggestion of C. F. Clarkson, was the formation of a committee of three to inquire into the existing and proposed legislation affecting

motorists. The three members appointed were: W. P. Kennedy, H. G. McComb and A. J. Slade.

The appointment of officers for the ensuing year was also part of the business transacted. J. A. Anglada was re-elected chairman of the governing committee; Herbert Chase, treasurer, and M. B. Pope, secretary.

At the annual meeting of the Society of Automobile Engineers held recently a committee was appointed to consider an improvement in the rim situation for pneumatic tires, the members of the committee being as follows: Henry Souther, chairman; H. L. Barton, G. G. Behn, T. W. Guthrie, F. H. Moyer, C. E. Reddig, W. C. State, J. G. Vincent, C. B. Whittelsey and C. B. Williams. This committee, which as a sub-committee or division of the Standards Committee of the society, will hold a meeting in Cleveland, O., on March 12 for the purpose of organization and hearing the views of representatives of some fifty pneumatic tire, wheel rim, steel bands and motor cycle manufacturing companies.

Napier Great on Benzol

LONDON, ENG., Feb. 26—The S. F. Edge, Ltd., London, has made a horsepower test with a motor designed for the 15-horsepower model Napier, the result being that the power developed by gasoline was 28.3 and by benzol 28.6 horsepower. Of gasoline, .75 pint was used for every horsepower developed, while only .70 pint benzol was needed for the same power output. This test would indicate benzol to be a satisfactory fuel, provided the price be brought below that of gasoline.

Working on Kerosene Carbureter

MILWAUKEE, WIS., March 1—That the Wisconsin Engine Company, Corliss, Wis., a large machinery and engine manufacturing concern which recently filed a voluntary petition in bankruptcy, was working on a kerosene carbureter, is divulged by the schedules of assets and liabilities just filed. Patterns, patents and drawings of the carbureter are listed as worth \$5,000. As the assets are \$909,000 and liabilities only \$315,000, it is believed the concern will be speedily rehabilitated and the kerosene carbureter it is working on will eventually be marketed. Edward T. Adams, formerly president of the company, is the designer.

A Manufacturer's View

INDIANAPOLIS, IND.—We believe that the consumption of fuel is to a great extent a personal equation to be solved by each individual motorist. Our records show that the best economy for brake horsepower hour, was obtained with a fourteen to one on ratio and with this setting no carbon monoxide could be detected in the exhaust. We believe that this ratio will not please the driver who is always in a hurry to get away and delights in dashing around slower vehicles, but for each percentage of carbon monoxide emitted in the exhaust from an overly rich or snappy mixture, a net loss of 4 per cent. in fuel will be suffered.

The majority of cars will emit as high as 10 per cent. of carbon monoxide, which represents a waste of nearly 40 per cent. of the fuel fed to the motor. Also speed means horsepower, and if speed is desired, economy cannot be obtained, at least the maximum.

It has been determined by repeated tests that it takes more gasoline to get speed and power than the amount necessary to get the highest efficiency.

Therefore, in all models of carbureters, it is best to use as weak a spring as possible, and to have the gasoline adjustment just strong enough to keep the motor from firing back into the carbureter. If it is desired to get the most miles per gallon, it is the best practice to have the carbureter so that when the throttle is opened suddenly the motor will spit back once or twice, but if the throttle is opened slowly there will be no such backfire.—GEORGE T. BRIGGS, Wheeler & Schebler.

Hup Wins Swedish Run

Is the First Out of Sixty-Six to Cover 738-Mile Course in Reliability

English Daimler Second

PARIS, France, March 4—*Special Cable.*—Of the sixty-six entries in the Swedish reliability trials, which started in Sweden on February 23 and covered 1181 kilometers or 738 miles, number one Hupmobile, which was first to start in the contest, was first to reach the finishing line. The second car was an English Daimler; the third, a Swedish car, the Scania Vabis. In the contest were nineteen American machines, thirty Germans, five English, two Swedish, four Belgians, four French, and two Italians.

Prince William of Germany, who was a contestant in the run, finished with a small penalization against him.

Little snow was encountered during the trials but the greatest difficulty was experienced with the ice coating on the hills, due to which it was thought at one time it would be advisable to postpone the trials.

Average Accident Statistics for 1912

NEW YORK, March 5—Statistics covering the number of persons killed in Greater New York by motor vehicles, horse vehicles, and trolley cars as compiled at the coroner's office for 1910, 1911, and 1912, show that there has been a heavy increase in the numbers killed by motor cars and trolley in 1912 as compared with 1911, whereas the number killed by horse vehicles decreased materially in 1912. The average of figures obtained from different sources is:

Vehicles	1910	1911	1912
Motor	144	141	216
Horse	219	245	184
Trolley cars	153	128	163

These figures are an average of those compiled from three different sources in New York City, the figures compiled differing so that the above represent a fairly accurate condition.

Chicago Firms Test Motor Spirit

CHICAGO, ILL., March 3—With a view to determining the value of its new fuel, Motor Spirit, in actual service, the Standard Oil Company, of Indiana has distributed quantities of the latest substitute for gasoline among some of the large truck users in Chicago and elsewhere. Some of the trucks have been operating on Motor Spirit for a period of 2 weeks and that it is meeting with favor is attested by the fact that of the twenty-one concerns in Chicago, originally supplied with one or two barrels of the fuel for test, twelve have been well enough satisfied to re-order supplies of the new fuel.

Chicago, in particular, has been favored with weather which provides a rigorous test; cold, snowy and blustery days and sharp winds have been the rule during the past month. This, combined with the fact that motors must be kept slightly warmer with the Motor Spirit than with gasoline perhaps has prevented the new distillate from making the showing it otherwise would have made. However, many of those who have tried it find that there is little difference between it and gasoline. The chief complaint of the truck operators themselves seems to be the smell. Those who carry their supply of fuel under the seat seem to be

the only sufferers in this respect. In the matter of mileage opinion seems to be divided.

Two concerns have actually tested the new fuel in service. These are Marshall Field & Co. and The Chicago Union Lime Works. The first concern had bad results, finding that they were unable to throttle down and had to use gasoline to pull their truck out of a snow drift. The second concern, which adjusted the carburetor to meet the requirements of Motor Spirit, had excellent results. It is evident that in using the new fuel about double the quantity of air must be used.

NEW YORK CITY, March 5—The high cost of gasoline has not affected the automobile industry alone. This is evidenced by the fact that the Dryers and Cleaners Association has resolved to combine their efforts with the New York Garage Association in their campaign for cheaper gasoline. A meeting of these two associations will be held tomorrow evening to map out a plan of action.

Omaha Show Breaks All Records

OMAHA, NEB., Feb. 27—With three times the number of paid admissions and several thousands more in attendance for the first day, as compared with previous years, the eighth annual automobile show, held under the auspices of the Omaha Automobile Show Association, in the auditorium, began with a rush Monday that forecasts the biggest success of any show ever held in Omaha or in the Middle West.

Not alone in attendance is this Omaha show a record breaker. Manager Powell is authority for the statement that one make of car brought 1,000 sales during the first 3 days.

BROOKLYN, N. Y., March 3—The third annual show which closed here Saturday, was a success. The official attendance figures have not yet been published, but it is said that close to 100,000 people visited the armory. A number of sales were closed by all exhibitors, the show proving much more of a buyers' affair than the New York show, although there seemed to be less ready money on hand than at the 1912 show.

HARTFORD, CONN., March 1—A dividend of about 50 per cent. will be returned to the dealers who exhibited at the recent Hartford automobile show held at the first regiment armory by Hartford Automobile Dealers' Association. This fact became known at a meeting of the dealers held at the Heublein this week.

Many Sales at Syracuse

SYRACUSE, N. Y., March 1—The fifth annual automobile show closed today with a total attendance for the 5 days of nearly 21,000, a record-breaking figure. Over seventy-five pleasure cars were sold during the show and about twenty-five trucks, this being the best record ever made at a Syracuse show. A large number of prospects were reported by the dealers and the outlook for the spring business is said by the dealers to be the best it has ever been. The farmers did considerable buying of both pleasure cars and of trucks. Generally considered, the industry in central New York is bigger and better than it has ever been.

MADISON, WIS., March 1—The Madison Automobile Dealers' Association has decided to give a third annual motor show in 1914, following the successful second annual event held February 19, 20 and 21 in the city market. The attendance was more than 4,000 and retail sales were made in large numbers. It is hoped that a larger building will be available by next year.

TORONTO, ONT., March 4—The 10-day annual automobile show, which closed Saturday night, proved by far the most successful exhibition ever held in Toronto. At least 70,000 people viewed the cars on exhibition. It is estimated that about \$1,000,000 worth of cars were disposed of during the exhibition.



Digest of the Leading Foreign Journals

Manufacturers in Germany Cautiously Preparing for the Technical Perfecting of American and British Motor Starters—French Small Cars Built for Economy of Upkeep—Water Injection Baffles Control—Philosophy of Skidding—Tantalum

AMONG Motor Starters—While the German automobile industry as a whole is inclined to take distance from the idea of installing a motor-starter apparatus in every car and fears the cost, the complication and the weight, it begins to recognize that the subject must be studied in order to keep pace with the development in America and England where a completely practical solution may be found any day by reason of the great amount of work devoted to the subject. It is also realized that the connection of an electric starter with an electric lighting system for a car and with the ignition system of the motor presents possibilities which have not been exhausted and which may justify the carrying of a storage battery, even if the latter must weigh at least 200 pounds in order to stand up to the work required of it. The similar connection existing between lighting and starting by means of acetylene gas is also becoming recognized, though with some misgivings as to whether the acetylene lighting system, with its tubular connections to the individual lamps, will be able to compete with the electric system in the long run. With this uncertainty in view, a preference is discernible for starting-systems by which the gas introduced in one or more of the cylinders for starting purposes may be either acetylene or a normal gas mixture produced from gasoline or benzol, but the necessity of firing any gas charge so introduced again points to the need of an electric battery, though not a large one, unless the magneto-exciter already in the market are developed so as to operate with unfailing certainty. On the whole the arguments for the different systems are looked upon as so intricately involved with technical progress not yet fully accomplished that the simplest possible apparatus supplemented with a starting crank for emergencies looks like the best chance for the immediate present to a conservative German manufacturer dealing with a conservative public.

The Ashford starter which meets this view fairly well is described by the London correspondent of *Allgemeine Automobil-Zeitung*. It consists in a hand-operated pump, for drawing gas mixture from the carbureter and pressing it into one of the cylinders, combined with a sparking apparatus for igniting the charge. It can be used with acetylene if preferred. The pump is placed with its handle protruding horizontally from the dashboard toward the driver while the barrel of the pump and the piping are under the motor hood. Pulling the handle out fills the barrel with the charge and pushing it back drives the charge into one of the cylinders. The position of the handle determines which cylinder the charge shall reach and where the spark shall be fired. As shown in the drawing, Fig. 1, four pipe connections, A, B, C and D, each with a check valve, serve for attaching tubes leading to the combustion chambers of the four cylinders. The mixture arrives from the carbureter through F, and the lateral branch E thereon leads to a special small gasoline reservoir, so that, if necessary, a specially rich mixture may be provided. At the other end of the pump there are seen four wire posts, *a, b, c* and *d*, which are wired to the spark-plugs of the cylinders, and there is secured to the pump piston

rod, below the handle, a conductive projection (as indicated in the auxiliary sketch with Fig. 1) between which and any of the four terminals a spark gap may be formed when the handle is turned so as to bring the projection opposite to the terminal. By this simple means the cylinder which is in position for an explosion is located.

At starting, the handle is first turned till a spark jumps across the gap at one of the terminals. Then the handle is turned still a little further, to a mark indicating that the pump now is in line for connection with the cylinder thus picked out as the right one to connect with. This done, the pump handle is pulled out sharply and at once pushed back again, and, as the piston works in unison with an internal distributor device which bars three of the four pipes, A, B, C and D, the gas mixture reaches the right cylinder, where it is ignited. The ignition may be taken care of either by means of a magneto-starter device or, more conveniently, by a battery with induction coil and vibrator. The high-tension wire is in this case laid from the coil over the distributor of the magneto.

If the motor is not started at the first attempt, the pump action may be repeated, and it is also possible, the German correspondent asserts, to load each of the four cylinders separately from the pump, to the extent determined by the positions of the motor pistons, before turning the pump handle into the position producing ignition.—From *Auto-Technik*, February 14.

THE Water Injection Theory—At recent trade exhibitions in Saint Petersburg and Jekaterinoslav in Russia extensive practical trials were conducted of a large number of stationary and marine motors, and in many of these motors certain devices for injecting water or steam into the cylinders, together with the fuel, were incorporated. The objects of water injection are (1) to contribute to the cooling of the cylinder walls and the combustion chamber, so as to obviate premature ignition, (2) to increase the compression of the explosive charge and thereby the economy of operation and (3) to obviate incrustations of carbon. The results of the trials showed very conclusively, however, that no means have yet been devised for regulating the water or steam injection so as to have it correspond, as it should do, to the variations in the work demanded of the motors. Only in the case of very skilful operation was the economy of the motor enhanced, and then only for limited periods. None of the automatic regulations proved available. A very considerable formation of coke in the combustion chambers was the uniform experience in motors of widely varying construction. When steam was employed instead, coal tar was formed. A whole kilogram of coke was taken from the ignition bulb of one motor. Ignition by incandescent bulb was a feature in a considerable number among the motors, and where this bulb communicated with the combustion chamber by a narrow neck the eventual result was invariably that the motor became stalled, because the carbon deposit coated the interior of the bulb and the temperature of the latter fell so low that

the charges were no longer ignited. The reliability of the motors was in all cases enhanced when the water injection feature was eliminated.—From a detailed account of the trials, in *Gas-motorentechnik*, February.

FOUR-CYLINDER Six-Horsepower Construction—Among the very small cars built in France this year to meet the "American invasion" or those popular requirements of whose commercial importance this invasion is the sign, one called Le Zèbre (the zebra) is the smallest, at least if only those with four-cylinder motors are considered, and its general plan as well as some of its construction details are of interest to show the mechanical and other means which appeal to French builders when the object is to secure the trade of those who must cultivate economy in their luxuries. While the makers of the Zèbre offer a single-cylinder car of five horsepowers for 3,000 francs and a four-cylinder car of ten horsepowers for about 6,000 francs, it is the four-cylinder car of six horsepowers which is considered the most characteristic and which was the pet of visitors at the recent Paris show. It is offered for 4,000 francs and is intended strictly for a maximum load of 225 kilograms, representing the weight of two passengers with light baggage, and it is guaranteed to make an average speed of 48 kilometers per hour, while using only 6 liters of gasoline and one-third liter of lubricating oil for a run of 100 kilometers. The dimensions of all parts of the chassis are pared down to sustain the economy of maintenance through a minimum of total weight while at the same time making room for a certain technical completeness which is considered of value to the user and therefore indispensable.

It is especially in the motor that this purpose has resulted in some notable departures from the construction customary for larger vehicles. The bore of the cylinders is 2 inches and the stroke 4 inches. To place valves of the size required by modern technique in the usual manner in a motor of these diminutive proportions was found impracticable, and they are therefore placed in two rows, as shown in Figs. 2 and 3. In order to reduce the volume of the combustion chambers somewhat, the valves are placed at a small angle with the axes of the cylinders. The spark plugs are located directly opposite to the induction valves. The camshaft is placed between the two rows and controls the tappet rods by means of little levers so arranged that the same cam successively operates the exhaust and the admission of the same cylinder. The exhaust manifold is bolted to the side of the block casting, while the intake pipes to the in-

dividual cylinders combinedly form the intake manifold at the rear end of which the carbureter is attached.

The thinness of the pistons made it inadvisable to secure the piston pins in them, and these are therefore integral with the connecting-rods and turn in the pistons.

The crankshaft is built up of three parts, comprising two cranks with counterweights and a central plate to which the crankpins are secured by cone joints and cotters. The first result of this construction is to modify the order of firing, since the first piston must move with the second instead of with the fourth. The lightness of the pistons offsets the poorer balancing which would be expected with this arrangement. As a matter of fact, it is stated, no vibration is noticed in the vehicle in whatever manner the motor is operated, the explanation being that the reactions due to the inertia of the cylinders are very small compared to those which might result from an unsymmetrical crankshaft, and also that the reactions from the exhaust upon the block-cast cylinders counteract the vibrations which the pistons might tend to produce. The firing is in the order, 1, 3, 2, 4, instead of the usual 1, 3, 4, 2.

The connecting-rods have no knuckles in two parts but a simple eye, with a bushing, as in single cylinder motors, and are mounted upon the crankpins before the crankshaft is assembled.

The oil reservoir is mounted upon the dashboard and the oil is placed under pressure by means of an air pump, the flow being regulated by a needle valve.

As the crankshaft is mounted in ball-bearings between the cylinder casting and the crankcase-trough, it is easily removed together with the connecting-rods and pistons. The three-speed gear-box and the wheel axles are also provided with ball-bearings throughout.—From *Omnia*, February 15.

TANTALUM, a New Material—For the tools of the draughting-room and for many purposes in the laboratory the use of tantalum as a standard material is now open for consideration. Tantalum was first employed industrially in 1905, and was not popularly known before that time. It was used for the filament of the tantalum incandescent lamps which have now won a broad market. The metal is produced from an oxide of tantalum ore which is not rare. Recently other uses for this material have been developed. Its fusion point is very high, and its resistance to chemicals coupled with its ductility, which renders it practicable to roll it into thin sheets and draw it into fine wire, suggested its use for dental instruments, and it is reported that a whole line of fine tools in this class is now manufactured. These tools are not affected by iodine and do not ir-

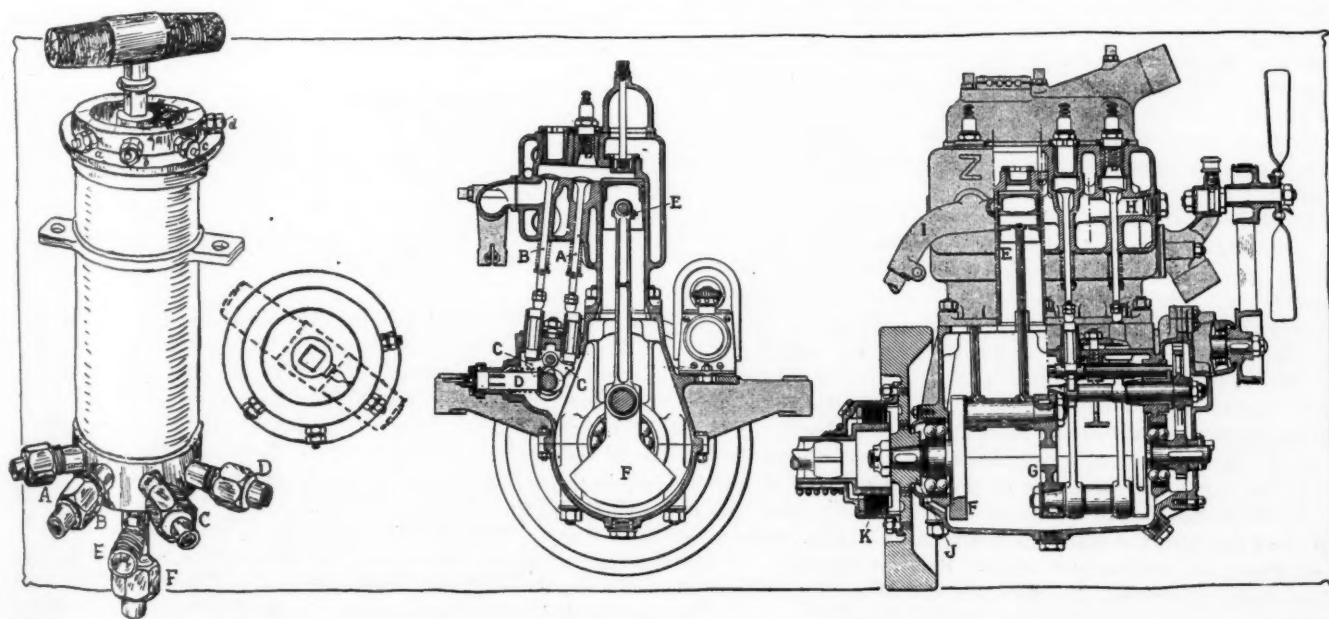


Fig. 1—Fuel pump for Ashford motor-starter. Figs. 2 and 3—Transverse and longitudinal sections of Zèbre four-cylinder, six-horsepower motor with built-up crankshaft and other unusual features

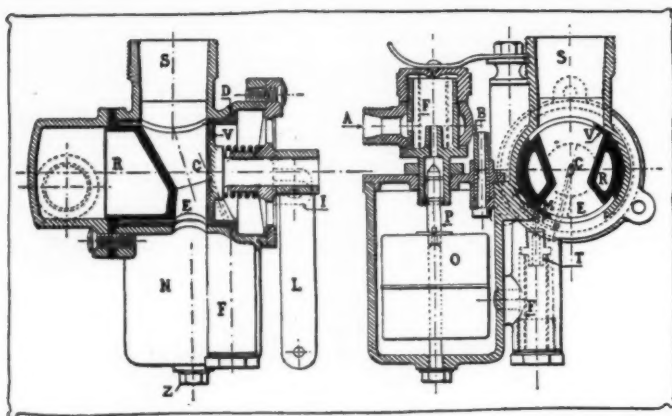


Fig. 4—Edelweiss carburetor with direct fuel control

ritate the gums. Writing-pens are also made of tantalum and are as elastic as steel pens while not subject to rust. Though exposed to corrosion from ink for several weeks, even if the ink contains acid, the new pens remain perfectly unchanged. Probably the material will soon be used for fountain pens to the exclusion of the much more expensive gold, over which it also has the advantage that it can be split, bent and shaped as freely as steel, while, also like the latter, it can be hardened by simple heat-treatment and in this manner can be made very resistant to wear.—From *Elektrochemische Zeitschrift*, January.

SKIDDING and Skewing—A lengthy study of the phenomena of skidding and skewing of automobiles by Henry Petit is summarized by the author in a number of conclusions among which the following may be of interest:

The fact that lateral adherence of a wheel to a road surface is much reduced when the wheel is kept from rotating may be utilized for making very rapid turns at high speed by applying the brakes to the rear wheels for a moment and allowing the centrifugal force to turn the vehicle around its front wheels. In case the front wheels skew to one side, the driver can utilize the same force which causes the front wheels to skew to correct the position and direction of the vehicle, by applying the rear wheel brakes, as the rear portion of the vehicle will then probably skew in the same direction as the front portion.

A vehicle whose wheel gauge is twice as large as the height of the center of gravity is practically secure against upsetting from centrifugal action, unless one of the wheels is positively prevented from skewing by a rut or other obstacle to transverse motion.

Among anti-skid tire treads those armored with metal studs have the advantage for certain road conditions and those made of rubber with larger projections and larger intervals between projections for other road conditions, the object being always to have the projections penetrate through a muddy layer to firm ground.

The differential, which is often accused of causing skidding, has on the contrary an action which is very efficacious to prevent it. Owing to its presence, the two wheels on the same axle are scarcely ever slipping at the same time. One of them continues to turn and its higher resistance to transverse motion holds the vehicle in line. If the two wheels were turned as a unit, the braking of one or both of them would remove the greater part of the lateral road adherence. It is this fact which renders it dangerous to apply the brakes on the wheel hubs harshly.

When the object is to avoid skewing as much as possible on all kinds of road surfaces, one of the driving wheels should be shod with a smooth tire and the other with an anti-skid tire, in which case one of the wheels will practically always continue to turn where the surface is slippery. But this provision, on the other hand, is poorly adapted to prevent slippage and loss of traction.

Slippage of rear driving wheels occurs most readily as the re-

sult of a braking effort, while a strong acceleration of the motor has a smaller effect in this direction. This is reversed if the front wheels are drivers; slippage will then occur mostly at the starting of the vehicle.

An excellent braking system is that adopted for the Argyll cars and consisting in coupling a brake on one of the rear wheels with another applied to the front wheel on the opposite side of the vehicle. In this manner, one front wheel and one rear wheel are always left free to turn, and the direction of the vehicle is not affected.—From *La Technique Automobile et Aérienne*, February 15.

CARBURETER with Direct Fuel Control—At two 15-minute tests conducted at the laboratory of the Automobile Club of France the carburetor shown in Fig. 4 and known as the Edelweiss developed 8.72 and 8.97 horsepower in a four-cylinder Renault motor of 75 millimeter bore and 120 millimeter stroke running at 1091 and 1098 revolutions per minute. The consumption was 3.468 and 3.512 kilograms per hour of "moline" fuel which has a specific gravity of 0.725. On the lowest adjustment the motor ran at 180 revolutions per minute. Accelerations were instantaneous.

The characteristic of this carburetor is the direct regulation of the fuel feed obtained by means of the rotary valve V in which there are openings E for the air intake and S for the gas mixture. It is tightly fitted on the seat D and upon its circumference there is formed a groove M which broadens out progressively, so as to present a small or a larger cavity—according to the adjustment of the valve—opposite the aperture in the seat through which the fuel is received, being first drawn from the nozzle T. The latter is made in several interchangeable sizes adapted for different motors. From the small end of the groove M a bore takes the fuel to the hole C opening into the carburation chamber of the carburetor at the point where the suction from the cylinder is strongest. When the valve is wide open, the communication from nozzle T to hole C is direct, and when the valve is turned the openings E and S are both gradually closed while the discharge of fuel is at the same time moderated by the modified position of the groove M. The shape of valve V may be realized when it is observed that the part of the illustration represents a section along the broken line SZ of the other part. RR indicates the provision for preheating the gas charge from the cooling-water or the exhaust gas. Several filters F are provided at the entrances of the gasoline to the float and from the float to the jet. It is stated by the testing engineer that condensation of the fuel vapor is avoided, even at lowest throttling, by reason of the high speed of the air current at the hole C.—From *Bulletin Officiel*, January.

The Song of Wire Wheels.—The soughing sound which is sometimes emitted by wire wheels, and which resembles that which comes from a ship's mast that bends in a strong breeze, is due to the elasticity of the rim which causes the spokes to rub where they touch one another. By greasing the spokes at the intersections the sound is reduced or obviated.—From *La Pratique Automobile*, January 10.

ABSORPTION of Driving Stresses—In about 75 per cent. of the automobiles shown at the last Paris salon the provisions for absorbing torsion and driving-thrust from the rear wheels were of one or the other of two types. Either the casing of the axle and the drive shaft transmits the thrust and absorbs torsion, and in this case the drive shaft has only one universal, while the springs have shackles in front and are secured to the axle by a joint admitting of some motion; or the springs serve all the three purposes—absorbing thrust, torsion and road shocks—have no shackles in front and are rigidly secured to the axle, while the drive shaft has two universals. Constructors are about evenly divided between these two systems.—G. Leroux in *Bulletin Officiel*, January.

Tire Carriers for 1913

More Attention Being Given to Neat Appearance and Rigidity—Single and Double Types

A MOST noticeable tendency in the automobile practice of the past few years has been the constant effort directed towards improving the appearance of the car as a whole. The automobile of today presents a much more pleasing effect than its predecessors of only a year or two ago. Perhaps the chief contributory cause for this improvement has been the attention paid to continuous lines in the design of the body, and in addition the elimination or concealment as far as possible of external parts, such as gear change levers. But a serious stumbling block to the intentions of the artistic designer was met in the shape of the spare tire.

The spare tire is an absolutely necessary equipment for a touring car. Unfortunately it is not in itself a thing of beauty, and the designer's first thought was therefore to get it stowed away out of sight. It is here that the difficulty is encountered; the modern automobile is a compact mechanism, lacking in internal spaces large enough to provide the necessary accommodation.

A makeshift solution to this problem of the satisfactory disposal of the spare tire which became widely adopted was that of carrying it in a vertical position on the running board. This position can claim very few merits and several disadvantages. Among the latter the chief is that the major portion of the running board is monopolized by the presence of the tire and the adjacent side door rendered useless. But there is the further disadvantage of detracting considerably from the graceful appearance of car. For these reasons it is not surprising that a more suitable and less conspicuous position was sought. On the majority of cars at the present time provision is made for carrying the spare tire or tires at the rear, and an inspection of the various methods of support show that much careful attention is being given toward the perfecting of this detail.

A characteristic of the rear tire carriers to be seen on this year's cars is the more rugged construction and the better means of firmly securing the tire or demountable rim. The amount of vibration and overhung weight of a rim fitted with a tire suspended on brackets projecting from the rear of the body is liable of underestimation. This was evident in many of the earlier designs.

The most common form of carrier is that in which three points of support are given to the tire. But there are besides those in which a scoop-like cradle embraces a sufficient portion of the circumference to form a strong seating, and also another type where the rim only is gripped, the tire not being touched. Both single carriers and double-ones are in evidence, and there are

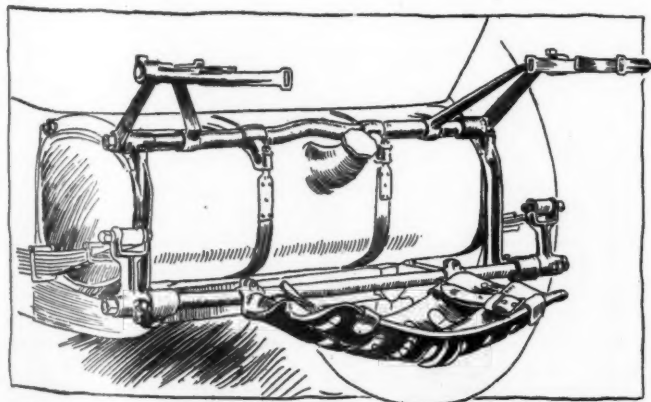


Fig. 1—Tire carrier fitted to gasoline tank of American cars

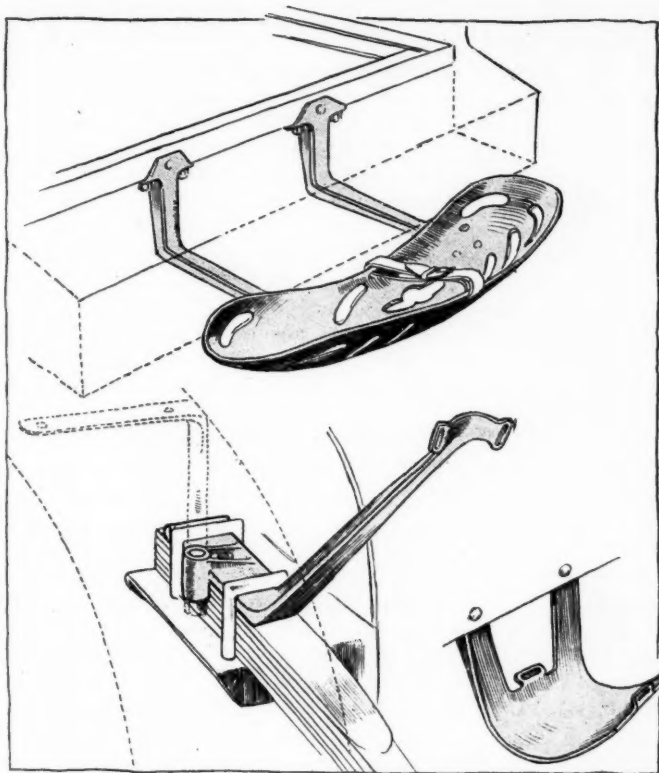


Fig. 2—Upper illustration shows Velle carrier in which the brackets form a support for tool-box. Below: Side and center tire brackets on Henderson cars, showing use of bracket base as clamping plate for spring and also as receptacle for fender carrier

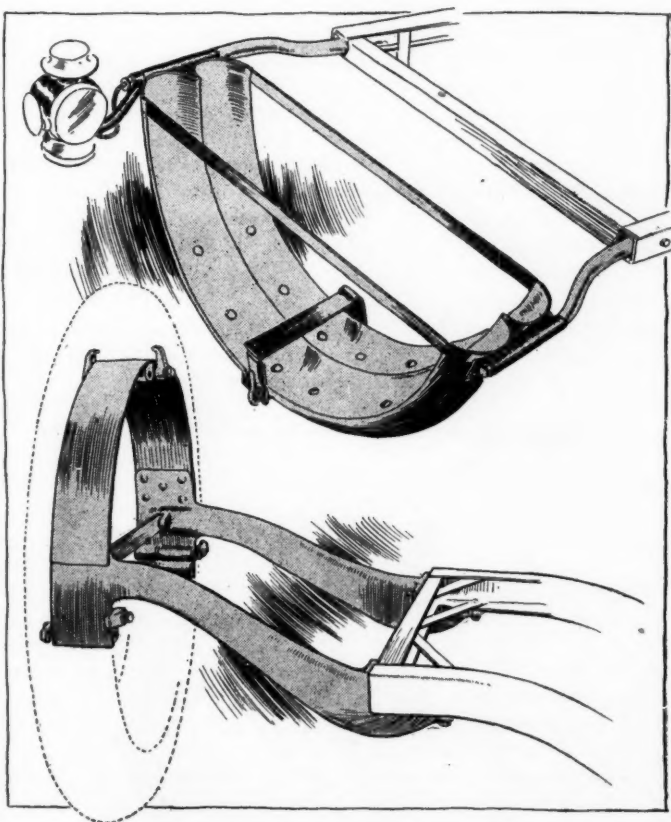


Fig. 3—Above: Double-tire carrier at rear of Oldsmobile, supported on tubular brackets and provided with a means of locking in the spares. Below: Rear carrier on Havers Six, which supports spare by clamping on rim. The brackets are made to form a continuation of the chassis lines

also many designs adaptable for carrying either one or two tires as required.

Other points of interest in considering these brackets are the means of clamping the tire into the carrier. In some designs a hinged clasp surrounds the tire; in others the ordinary leather strap is relied on. The former method permits the introduction of some form of lock to prevent theft, while the leather strap method, which is in the majority, ensures absolutely tight fastening irrespective of differences in the size of the tire.

Another interesting feature of the latest designs of tire carriers is that of saving weight by utilizing the brackets for some other purpose. Thus in one make the brackets form a support for a tool box, in another a support for the tail lamp is incorporated, while in a third the same frame extension to which the carrier is bolted forms an anchorage for the suspension of the gasoline tank.

The accompanying illustrations do not exhaust the many interesting types to be seen on the 1913 cars, but they are sufficiently comprehensive to indicate the extreme variety of methods of carrying spare tires.

American

A method of utilizing steel tubes to strengthen the gasoline tank and at the same time form a structure on which to mount the brackets of a tire carrier is shown in Fig. 1, being that adopted on the American cars. The side brackets are malleable castings to which the tires are fastened by leather straps. As shown in the illustration the accessibility of the filler cap of the tank is not interfered with in any way by the presence of the spare tires.

Velie

Fig. 2 shows two types, the upper being that fitted to the Velie cars. This consists of a malleable casting in the form of a cradle conforming with the curvature of the tire, riveted to a pair of steel angle brackets which are bolted direct to the frame. It will be noticed that the brackets are utilized as a support for a tool box, which conceals them and so conduces to the neat appearance of the back of the car. This desirable feature is further enhanced by the fact that the carrier itself, having no projecting parts, is also scarcely visible when a tire is in place. Ample provision is made for drainage and dissipation of moisture by a number of ventilating holes.

Henderson

The lower illustration in Fig. 2 shows an ingenious method of adapting side carrier brackets to the Henderson cars. The base of the bracket is made to answer the purpose of a clamping plate for the rear springs. In addition, a boss cast on the base provides a socket for the angle support of the fender. The

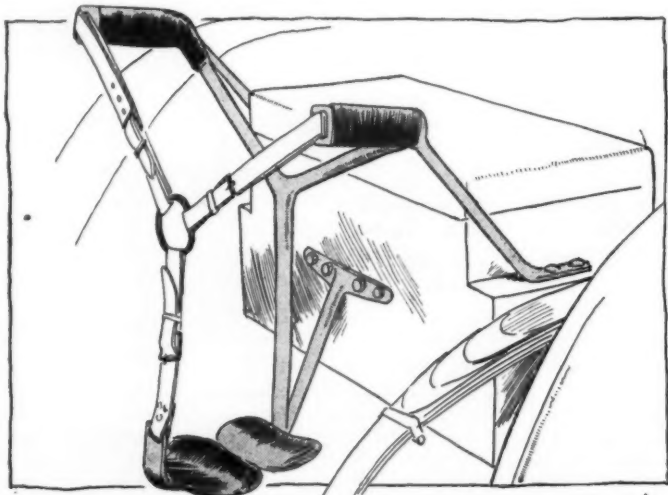


Fig. 4—Spider type of rear carrier on Pullman roadster

lower central tire bracket, also a malleable casting, is shown. Both are intended for use with leather straps.

Oldsmobile

Two tire carriers marked by much originality of design are shown in Fig. 3. The upper one, fitted to the Oldsmobile, is unusual in that the carrier is made large enough to embrace half of the tire, or tires, for it is a double design, thereby obviating the necessity of any additional support above. The double cradle is made from a single piece of sheet steel, and is carried on bent tubular brackets extending from the side members of the chassis, to which they are bolted. The tires are held in place by a hinged clamp which bears on the inner surface of the demountable rim and is provided with a lock and key.

One of the tubular brackets acts as a support for the tail lamp, the cable for which is passed along inside the tube to the channel side member.

Howard

Fig. 3 also shows the rigid form of rear carrier fitted to the Howard Six for this year. This is designed to carry the spare by means of the rim only, the tire itself being free. Although there is considerable overhang the design of the brackets suggests that the possibility of vibration taking place is very remote. The outer ends of the brackets are connected by a straight distance bar and also a semi-circular band of steel furnished with a pair of rim clamps at its upper center. Two similar pairs of clamps are fitted to the brackets. It will be observed that each clamp jaw has its own tightening bolt and that it is only necessary to slacken three of these and turn them in to permit

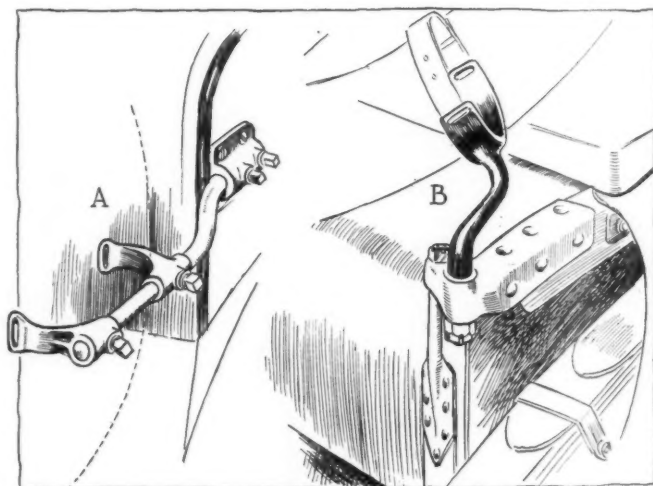


Fig. 5—A, adjustable carrier bracket on Moline coupé; B, tire carrier on Marmon two-seater

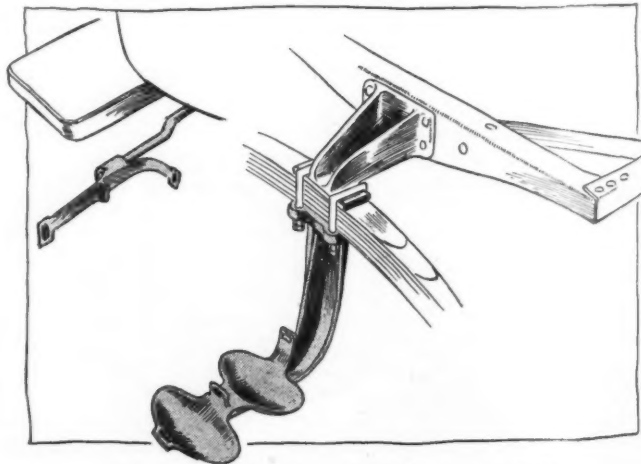


Fig. 6—Havers design of double tire brackets

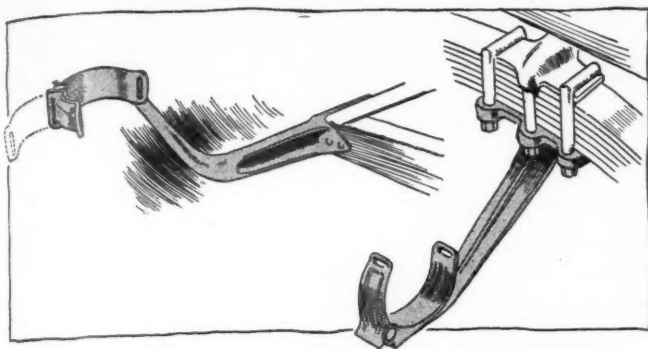


Fig. 7—Rear brackets for spare tires on Cadillac

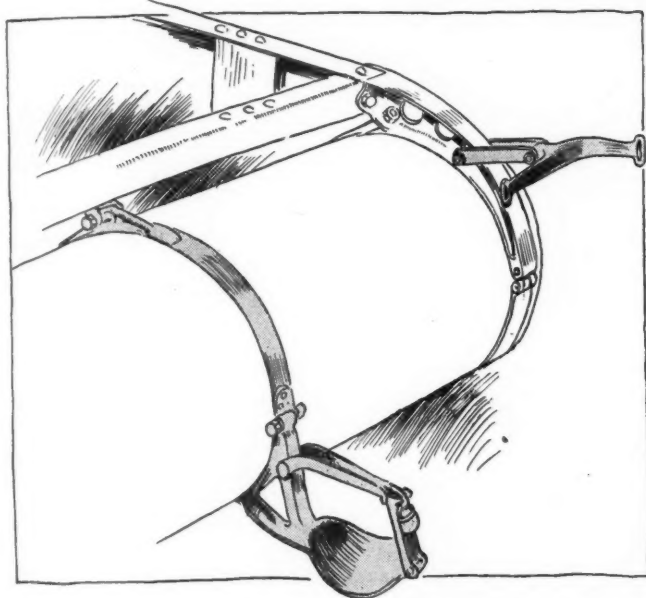


Fig. 8—Method of attaching tire carrier to tank on Edwards-Knight

removal of the rim. From the point of view of appearance, the rather massive form of the brackets is a point in its favor.

Havers

In the Havers design, Fig. 6, advantage is taken of the existing center bracket of the transverse spring, the lower tire carrier support virtually forming a continuation, being bolted thereto by the spring clips. Two side brackets supporting the tire at its horizontal diameter are bolted to the body.

Pullman

An unusual form of double carrier is that on the Pullman roadster, Fig. 4. A forged steel spider is mounted to the rear of the tool box to which it is attached by three arms. Two spoon-shaped receptacles at the base form a bearing for the tire, while the upper arms of the spider are covered with leather to protect the surface of the rubber. The straps are not arranged to surround the rim, but are tightened up against the face, as shown in the illustration.

Marmon

In the Marmon two-seater, B, Fig. 5, short extensions are riveted to the chassis members to form a seating for the carrier brackets which are arranged to hold the tire in the sloped position generally adopted in the case of two-seaters. The same frame extension is also utilized as an anchorage for the suspension of the gasoline tank.

Moline

The carrier fitted to the Moline coupé, A, Fig. 5, is chiefly interesting because of its large range of adjustment and the fact

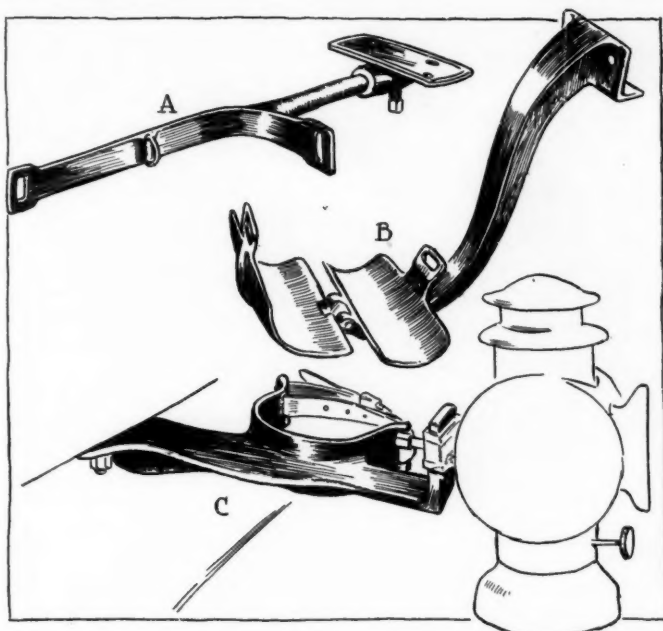


Fig. 9—A and B, tire carriers supplied by the Emil Grossman Co.; C, combined tire and tail lamp bracket on Marathon cars

that it is easily removable. A socket for the reception of the bracket, attached to the side of the body, makes it possible, by turning the cranked rod, to adjust the distance apart of the two brackets. The jaws, also adjustable, permit of their being arranged to accommodate one or two tires.

Cadillac

On the Cadillac touring phaeton a three-bracket type of carrier is fitted, Fig. 7. The center bracket, a malleable casting, is attached to the point of support of the transverse spring, the side brackets being bolted direct to the chassis members. By hinging one-half of the jaws which take the tire this carrier is adaptable for either one or two tires, it being merely necessary to adjust the leather straps.

Edwards

A unique method of attaching the tire carrier is that adopted on the new Edwards-Knight, Fig. 8. Here the center tire support is fitted to the cylindrical gasoline tank by means of a band fastening, the side supports being linked to the phosphor bronze brackets which carry the tank. A means of locking is incorporated in the lower tire fastening, while the side brackets are adapted for leather straps.

Marathon

The Marathon is provided with three tire brackets, attached to the rear of the body, C, Fig. 9. These are all malleable castings. One of the upper side brackets has an extension to take the tail lamp, as shown in the illustration.

Emil Grossman

It is to be wondered at that the accessory dealers are not more active in the preparation of tire carrier designs. The reason is doubtless that the particular conditions to be met in the case of each automobile differ so widely that it becomes difficult to furnish a carrier applicable to all. However, there are a few such devices on the market. One of these, produced by the Emil Grossman Company, possessing a great degree of adaptability, is shown at A and B, Fig. 9. This consists of two strong malleable cast brackets, the center one being intended for direct attachment to the frame, while the side brackets, furnished with a stem for adjustment, fit into sockets screwed to the body. The bracket B has a hinged tire support so as to be adaptable as a single or double carrier.



The Engineers' Forum

Use of Leather for Universal Coupling

Leather Rings Showed No Break or Tear Under a Load of 1,040 Pounds On Olsen Torsion Test Machine

Manganese-Bronze Cylinder Cracked and Broke When Subjected to This Strain on the Same Apparatus

*Frank H. Kaiser Tells of Interesting Test
J. Demmler Thinks Horsepower Best Tax Basis
Ferdinand Jehle's Views on Exhaust Gas Analysis*

NOTE—The discussion of the subject of exhaust gas analysis by prominent automobile engineers in THE AUTOMOBILE is continued from week to week in the Engineers' Forum. Any of our readers interested in this topic are cordially invited to submit their views.

WEST TORONTO, ONT.—Editor THE AUTOMOBILE:—Knowing that leather will give freely, it was experimented with in connection with a universal coupling to determine if it would give the self-aligning property to the assembled coupling. It was essential that the coupling be self-aligning.

The leather as tested was old two-ply belting, 9.75 inches wide, which was in good condition and more pliable than new leather. Four pieces or strips, each 3 inches by 9 inches, were cut from this belting. Pieces marked No. 1 and No. 2 in the accompanying table were cut crossways and those marked No. 3 and No. 4 lengthways of the belting. Steel plates, 3 inches by 2.25 inches by No. 11 gauge, were riveted to the leather as shown in Fig. 2. This was done to insure perfect gripping in the testing machine.

The table shows the length and width of leather strip test pieces at different loads during the test. It will be noticed that strips No. 3 and No. 4, which were cut lengthways of the belting, were stronger, and after the break the length and width were practically the same as at the start. Each piece broke at the end in the top of testing machine, the leather breaking between the steel plates on a line horizontal to the center rivet.

In the same table is also given the tensile strength in pounds of each leather strip, and the calculated tensile strength in pounds per square inch of cross-section and the tensile strength in pounds per inch width of leather.

The universal coupling consisted of a manganese bronze cast-

ing the shape of a hollow cylinder diverging at each end in the form of a flange. The leather was cut ring-shape, and this manganese bronze casting was riveted, at each end, through one of these leather rings at the inner or smaller diameter into a narrow steel ring. This steel ring prevented the rivets from tearing the leather. At the larger diameter or outer edge of the leather ring was riveted in the same way at each end a flange which was a manganese bronze casting. To each flange was keyed a shaft.

It will be perceived that the hollow cylinder was suspended by leather. The power was transmitted from the shaft at one end to the flange, thence through the leather ring to the cylinder; from the cylinder to the other leather ring, to the flange and then to the other shaft. If at any moment these shafts were out of line, the strains thus set up would be neutralized, so to speak, by means of the leather rings.

A universal coupling thus assembled was tested by gripping the outer end of each shaft in an Olsen torsion test machine. When the load, applied gradually, amounted to a force of 1,040 foot-pounds, the manganese bronze cylinder cracked and broke. The leather rings did not show any break or tear. This force of 1,040 foot-pounds was greatly in excess of the actual torque delivered by the engine to the coupling as assembled in the automobile. The coupling is a success and fulfills its requirements.

The writer wishes to express his thanks for suggestions received from Mr. L. R. Evans, chief engineer, and Mr. A. Fish, mechanical engineer, of the Russell Motor Car Company, West Toronto, Ont.—FRANK H. KAISER, Russell Motor Car Company.

Wants Horsepower as Tax Basis

GROVE CITY, PA.—Editor THE AUTOMOBILE:—Taxes on automobiles are an injustice against every automobile owner.

Does every wealthy man own an automobile? Certainly not.

Men who buy automobiles and also spend a part of their money for upkeep every year, those are the men which are doing pioneer work in uplifting an industry, these are men who contribute their share for the welfare of the people.

It would be worth while to consider the idea that men who do not spend a cent for automobiling should be taxed for upkeep of roads on which the auto owners are driving along; this would be justice to both parties and boom the automobile industry considerably.

The S. A. E. formula doesn't give any value as to the amount of work required to propel a car along the road.

With a medium-powered car, a driver averages about 20 miles an hour, on level country, and taking into consideration the carrying capacity of the car, its own weight and the coefficient of friction between the rear wheel and road, it is surprising to note the difference between the horsepower of the motor figured according to the S. A. E. formula and the actual work done at the rear wheel for propulsion of the vehicle. This has reference to any size of car. The result is somewhat different in hilly countries.

But it doesn't matter whether the number of horsepower for a given size of motor figured by the S. A. E. formula is too high or too low for a basis of taxation if a certain amount has to be raised through taxation of automobiles.

Taking another formula into consideration, which also includes the value of the car and reads:

Taxation value = X. S. A. E.

The factor X should have a sliding scale; a car selling for \$1,000 the factor should be equal to 1. For all cars selling higher than \$1,000 a scale could be worked out so that the fac-

tor X would range between 1 and 2, and brought in accordance with the scale, giving the sales price of cars.

For cars selling for less than \$1,000 the factor X should be smaller than 1, and could vary between 1 and 0.4.

This formula also would take into consideration second-hand cars, whose value always is in reversed proportion to the age of the model.

Even if the formula of horsepower taxation would put the motor of a second-hand car higher up in the table of taxation, the factor taking into consideration the value of the car, would lower the result expressed in formula:

$$A = S. A. E. X.$$

Where A would indicate a certain value and serve as a basis to figure the amount of taxes which should be paid by the car owner.

In my opinion it is useless to prove that it is unjust to use the S. A. E. formula as a basis for taxation as long as the government wants to raise a certain amount on taxation of automobiles.

As long as only the size of the motor is taken into consideration any other formula would not change the final results, and a formula giving a lower horsepower than the S. A. E. would certainly not reduce the amount of taxes, as the government has only to raise the level of taxation to get the amount which taxation on automobiles should bring.—J. DEMMLER, Chief Engineer Bessemer Motor Truck Company.

Making Exhaust Gas Analysis

DETROIT, MICH.—Editor THE AUTOMOBILE:—The analysis of the exhaust gases in a motor test is an important part of the test. If the work is done carefully and accurately, it gives us more real information of the fitness of the carburetor to the motor, and of the correctness of carburetor adjustments than any other form of investigation. If the work is not done carefully, the results will be very misleading and sometimes ridiculous. The collecting of the sample demands the greatest of care.

First, the connections must be so made that there can be no leak of air into the sample tube.

Second, the sample tube should be connected as closely as possible to the last cylinder. If it is connected at some distance, and the exhaust pipe becomes red hot, the after-burning will effect the sample. We are only interested in the combustion that occurred in the cylinder.

Third, the sample must be taken over sufficient time so that it really is a true sample.

Fourth, the analysis of the sample must be made with extreme care, and by a person who has had experience along such lines.

To prevent air leaking into the sample, it is best not to suck the gas in with too great a head. It would be best to always keep the height of mercury or water in the sample and displacement tubes the same, then the slight pressure of the exhaust gas will fill the tube—any leak will then be toward the outside.

In every scientific test, of course, gas analyses are always taken. They have, however, a great commercial value as well. It is by far the quickest method of determining the best ad-

justment of the carburetor. Of course, the carburetor may be adjusted by the aid of a dynamometer, changing the adjustment until the highest load is reached at any one speed. This will then be the best adjustment for power, but it may not be for fuel consumption. After the best power has been reached, the fuel may be cut down still further without reducing the power. If a curve be plotted, using for abscissæ the opening of the fuel valve and for ordinates the power developed at a constant speed, we find that the curve is parallel to the horizontal axis for quite awhile. The best carburetor adjustment for both fuel economy and power can therefore be read from such a curve. Figure 1 shows a sample curve. The same result may be much more rapidly arrived at by changing the adjustment of the carburetor until the analysis of the exhaust gas shows practically no CO and a small percentage of O. The CO₂ will then be between 13 and 14 per cent.—FERDINAND JEHL, Commercial Engineering Laboratories.

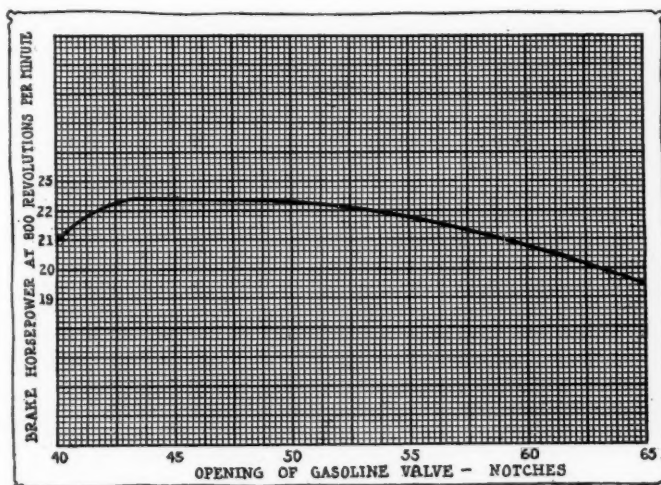


Fig. 1—Sample curve for reading best carburetor adjustment

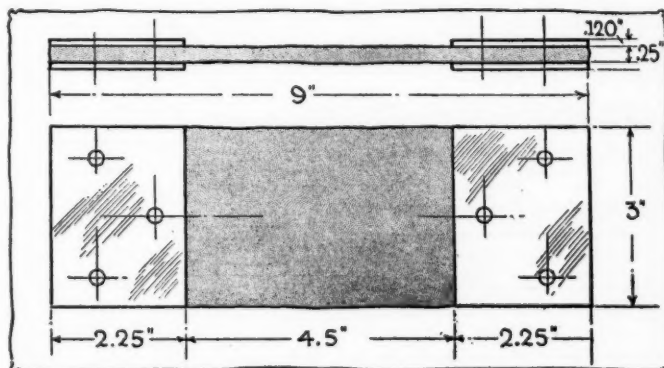


Fig. 2—Dimensions of test pieces used to obtain tensile strength of leather

Table Showing Condition of Test Pieces Up to Breaking Point, and Tensile Strength Obtained

Test Piece	Load in Pounds	0	500	750	1000	1250	1500	1750	2000	2250	2500	After Break	Ultimate Load	Tensile Strength per Sq. In. Cross Section	Tensile Strength per In. Width of Leather
1	Length....	4.6	5.07	5.28	5.4	5.58	....	....	....	....	....	4.92	1435 lbs.	1912 lbs.	478 lbs.
	Width....	3.0	....	....	....	2.65	....	....	....	....	....	2.7	....	....	....
2	Length....	4.65	5.28	5.48	5.7	....	....	....	....	....	....	4.88	1200 lbs.	1600 lbs.	400 lbs.
	Width....	3.0	2.8	2.74	2.64	....	....	....	....	....	....	2.9	....	....	....
3	Length....	4.55	4.74	....	4.77	4.84	....	4.97	5.06	5.11	5.16	4.6	2500 lbs.	3332 lbs.	833 lbs.
	Width....	3.0	2.94	....	2.74	2.74	....	2.74	2.74	2.74	2.74	3.0	....	....	....
4	Length....	4.55	4.82	4.84	4.85	4.92	4.98	5.04	5.11	....	....	4.6	2220 lbs.	2960 lbs.	740 lbs.
	Width....	3.0	2.96	2.93	2.93	2.93	2.93	2.93	2.93	....	....	3.0	....	....	....

Truck Inspection

Regular Examination of Freight Automobiles and Detailed Reports to Owners Do the Work

[illegible]

SYSTEMATIC inspection of freight automobiles by representatives of the maker constitutes a service which goes with the products of most prominent truck makers which are sold in large cities. This inspection service is free to the truck user, that is, it is not paid for from case to case, although it is, of course, included in the selling price of the truck.

The purpose, use and value of systematic truck inspection may be summed up as follows:

1. **VALUE TO THE MANUFACTURER.**—The maker being kept informed of the weaknesses of his product is put in a position to improve on the parts inferior in design and construction. He may devise means for effectively protecting parts which originally are apt to be damaged or abused. He may, thereby, lessen the cost of upkeep and guarantee work, and render the entire maintenance of the truck less, which makes the product easier to sell.

2. **VALUE TO THE OWNER.**—The owner's attention is called, by inspectors' reports, to the abuses of his truck by the driver, so that he may hereafter watch out to prevent such practice from being continued. He is thereby made to reduce the upkeep cost of his truck. The consequent diminishing of expenses results in greater business profits.

3. **VALUE TO THE TRUCK.**—The better care which the truck will get, due to the points brought out in the foregoing paragraphs, results in longer life, lower total cost and better efficiency of the truck and its several elements.

4. MORAL EFFECT ON THE DRIVER.—The man who drives the truck, if he knows that he is being watched, will try to do better so as to hold his job and, if possible, to improve it. The truck will be all the better for the driver's moral rise.

5. MORAL EFFECT ON THE OWNER.—The man who owns the truck, seeing that the maker keeps his interest in view and tries to reduce upkeep for him, will appreciate this work on the part of the manufacturer and, other things being equal, prefer the truck of a company giving good inspection service to one of a maker who does not.

International Uses Two Trucks

In the following a number of truck inspection systems, used by large New York City branches, are described in short and the forms illustrated. The inspection is extended to the trucks in most cases, periodically, either at fixed intervals or at such periods as the branch sees fit. In inspecting the automobiles, the men doing the work try to catch the truck on the road, thereby taking the driver unawares. The truck is then looked over, the important parts inspected, noises followed up, adjustments made, parts lubricated and so forth. Incidentally the driver is taught how to make minor adjustments and how to take care of the truck as a whole. After this inspection has been completed, the inspector, having returned to the service department, makes out a report of his work and a letter telling the truck owner of the condition, the needs and the troubles of the freight automobile.

The International Motor Co. sends its inspectors to look over every truck in use in the Metropolitan territory, having these inspections once every fortnight, approximately. The inspectors communicate with the truck owners, find out where the truck runs on a certain day, and then each inspector sets out in an automobile to catch the machine on the road. This being done, the inspector looks over the mechanism for loose parts, see whether magneto and carbureter are in good order and what parts are in need of oiling. Minor adjustments, such as that of a brake, the differential and steering gears, are also made by the inspector. He then lets the driver operate the truck and if the man does anything wrong, the inspector instructs him how to do things right. At all this work, the inspector makes notes on the road report blank, Fig. 2. This form is printed black on thin tan cardboard, 8.62 by 8 inches and having space for reporting the name of the owner, the number of truck and motor, date of the inspection and the work done. Each part is separately checked, and depending on its condition, is marked

O. K., in need of shop repair or as having required repair work on the road, which had been done by the inspector. When the cardboard record has been filled out, the driver signs it, after which the inspector returns to the service department. There he dictates the report, Fig. 1, five copies of which are prepared at the same time by the use of carbon sheets. The items appearing on this record are simply duplicating those of Fig. 2, but the report, Fig. 1, is much more adapted for office use. Each of the five copies is printed with black ink, but on thin, almost transparent paper, for various departments, to which the copies are forwarded as follows: White paper, No. 1, to general sales agent of the company at New York; light blue, No. 2, to auditor; light tan paper, No. 3, to agent or branch manager—the report blanks are in use in other cities as well; pink paper, No. 4, to the local service department manager; orange paper, No. 5, to the shop of the service department. A letter is then sent to the owner of the truck informing him of the results of the inspection.

The Packard Motor Car Co.'s inspection service is entirely different from that just described. Packard trucks are inspected once a month during the first year after sale. For this inspection the machines are driven to the Long Island service department of the company and half a day is spent there by an inspector and the driver. After the end of the first year appointments must be made for these inspections. The driver is made to make adjustments and minor repairs under the observation and instruction of the inspector, thereby being familiarized with the mechanism and its requirements. After the half day is over the driver is again put in charge of the truck, the machine having been tested on the road, if necessary. Hereafter the service department makes out a triplicate inspection report, a copy of which goes to the owner, the duplicate to the New York office and the triplicate remains in the Long Island plant. In this way the New York establishment, from which the truck was sold, is kept posted on the history of the truck and enabled to treat the owner in the proper manner if he is again approached.

White Company Inspects Monthly

A different scheme is in use with the White Co. It employs two inspectors who are constantly on the job, traveling over the roads and looking for White trucks, after having been informed by the truck owners where their machines are apt to be at a certain hour of a certain day. Thus, once a month, every White truck in the New York territory is looked over by inspectors according to similar rules as those used by the International and Packard companies. The inspector makes his road notes on a pad of plain paper and transfers them after having returned to the service department to two sheets, Fig. 4. This blank is made in duplicate, being 8.5 and 13.5 inches; the original is printed on blue paper and the copy on yellow; one copy is kept by the inspector and the other in the file of the service department, after Fig. 5 has been filled out. This latter blank is a letter form, 8.5 by 11 inches, and printed with dark red type, the original on white paper and the office copy on orange. The letter form provides space for stating the results of the inspection, the work done by the inspector and suggested repair work. The superintendent of the service department signs the report of the inspector.

The New York representative of the Pierce-Arrow Motor Car Co. sends its inspectors after the trucks as often as it considers it necessary to do so. Repairs are made, the driver is instructed as in other systems, and after the inspection is over the results are compiled on a card of the same size as Fig. 2 and practically the same design. This card enumerates most of the parts of the car, and in spaces provided for the purpose the items are marked: S, A, O or Z; S means that the inspector, having looked over the part, found it in satisfactory condition; A denotes that the part required the attention of the inspector and received it, being in good order when he left the truck; O shows that the part is in need of attention and that the driver promised to take care of the situation, so that the matter is

By the work of inspectors who, at regular intervals, examine the trucks sold by a company, the truck owner is aided and the business of the company is increased. It is necessary that this work be carried out conscientiously and records be exact and complete, to make the idea of free truck inspection a success from every point of view. Poor work is worse than none.

TRUCK INSPECTION REPORT

Motor No. _____ Wagon No. _____ Mileage _____ Date _____

INSPECTOR _____

The examination as reported above is of a superficial nature, and is not to be considered as indicating positively the true condition of the vehicle. Further and more detailed report may be obtained by having the truck examined at our Service Station by appointment.

The White Company
BROADWAY at 62d STREET
NEW YORK

Truck Inspection Report Date _____

Owner _____ Town _____ No. Miles Run _____

Inspector _____ Model _____ Motor No. _____

<input type="checkbox"/> Motor	<input type="checkbox"/> Grease Caps	<input type="checkbox"/> Wheels	<input type="checkbox"/> Chains
<input type="checkbox"/> Ignition	<input type="checkbox"/> Clutch	<input type="checkbox"/> Axles	<input type="checkbox"/> Spind
<input type="checkbox"/> Magneto	<input type="checkbox"/> Foot Brakes	<input type="checkbox"/> Tires	<input type="checkbox"/> Overload
<input type="checkbox"/> Carburetor	<input type="checkbox"/> Emergency	<input type="checkbox"/> Radiator Rods	<input type="checkbox"/> Holes
<input type="checkbox"/> Oiling System	<input type="checkbox"/> Steering Gear	<input type="checkbox"/> Radiator	<input type="checkbox"/> Cleaving
<input type="checkbox"/> Transmission	<input type="checkbox"/> Universal Joints	<input type="checkbox"/> Springs	<input type="checkbox"/> Driving

CHECK ABOVE ITEMS IF O. K. WHEN SPECIAL REPORT IS NECESSARY GIVE BELOW WITH REASON FOR CONDITION

Motor	Wheels
Ignition	Axles
Magneto	Tires
Carburetor	Radiator Rods
Oiling System	Radiator
Transmission	Springs
Grease Caps	Chains
Clutch	Spind
Foot Brakes	Overload
Emergency	Holes
Steering Gear	Cleaving
Universal Joints	Driving
Complaints	Remarks

Fig. 3—Truck inspection blank used by the Packard company's inspectors, one copy being kept at the branch, one at the New York office and one being mailed to the truck owner

Fig. 4—White company's report is made out in duplicate by inspectors

in the hands of the owner, while Z is a note to the effect that shop work is necessary to put the part in good condition. Special attention is paid to the tires and their condition, and make, mileage, date of installation and condition are noted in the instance of each of the six tires, there being dual wheels on all Pierce-Arrow trucks. The following abbreviations stand for the various tires: F. R., front right; F. L., front left; R. R. I., rear right inner; R. R. O., rear right outer; R. L. I., rear left inner; R. L. O., rear left outer. After this report has been made out and turned over to the office, the superintendent of the truck service dictates a letter to the owner informing him of the points covered under A, O and Z, and stating just what repair work is needed to put the truck in perfect shape. Of course, the inspector having made notes, if the driver of a truck does not take good care generally or in any special respect this information is also placed at the disposal of the owner. In this way the owner is enabled to eliminate unfit elements among his driving force and to keep the good workers and advance them according to their merits.

The Peerless Motor Car Co. inspects its trucks no less than once a month, and then the work is done on the road. The inspectors overtake the drivers on the road, having learned their route from the truck owners. The inspection work includes an

Fig. 5—White company's form of letter for owner's inspection report

examination of all essential parts, with minor repairs and adjustments being made right on the road by the drivers under the inspector's supervision. After this has been done, the inspector looking over a truck takes the latter and drives it for the next 5 miles so as to become acquainted with the trouble not developing during a stationary examination. The troubles and noises are then eliminated as far as possible, and the inspector makes his notes. After returning to the company's service department he makes out a triplicate report on the blank, Fig. 7. This form is printed black on yellow paper, 8.5 by 11 inches, and the duplicate and triplicate are made by means of carbons. The first copy goes to the owner of the truck, the second to the office of the service department and the third to Cleveland, so as to keep the factory posted on the history of each truck. As in the case of the Harrolds company, special attention is paid to each individual tire, and whatever remarks cannot find space on the front page of the form, under the various headings,

Fig. 6—Harrolds company's inspector's report blank for road work

Fig. 7—Inspection report made out in triplicate by Peerless men

are noted on the reverse thus affording ample space for details.

An inspector can make from 100 to 120 inspections per month, so that the cost of each individual examination is relatively small and really trifling when compared with the saving effected by calling attention of the truck owners to detrimental conditions.

Harking Back a Decade

FROM THE AUTOMOBILE of March 7, 1903:

The attendance at the Crystal Palace in comparison to the Grand Palais was probably one-half but, withal, this was a large attendance, considering that the Grand Palais had a paid admission of over 300,000.

Each maker of course is anxious to start first because the leader always has an immense advantage over those who follow him. He has a clear road and a clear atmosphere and can travel all the way at the highest possible speed. The man behind gets the dust, and unless by a very lucky chance—through a short stoppage of the leader for example—he has very little opportunity of passing. The dust is usually so thick that he has to keep prudently in the rear. If he makes a dash, he sees nothing around him. He is in a cloud of dust and only knows that he is near the car by the small stones which tingle his face. He knows, too, that the leader is in the middle of the road. It is of no use to sound the horn, for the man in front can't hear, and he risks his life when he tries to blindly squeeze through between the car and the roadside. No wonder the stoutest heart falters when it comes to fighting an invisible rival in this cloud of dust and stones.

It is generally accepted among contractors that a good horse on fairly good roads has a working capacity for 300 days in the

year of 36 ton miles a day, and that in such work he has 5 years of effective service.

Improvements in the carbureters, mufflers and engines have brought about the present flexibility in the operation of gasoline cars, and have almost eliminated the noise which was so dear to the pioneer and so objectionable to the motophobes.

Among the transmission gears on cars exhibited at the New York show, especially those which ran in an oil bath though not belonging to the sliding-gear class, that on the Pope-Robinson cars attracted some attention, but could not be fully investigated on account of pending foreign patents.

The new Fredonia car represents the latest development of the light road car, every detail being of standard make. The wheel-base is 72 inches, the weight is 1,300 pounds, the speed ranges from 4 to 30 miles, the body is finished in black, with gold-leaf stripe and the gear is painted carmine, with black and gold stripe on it.

H. B. Larzere, a San Francisco automobile dealer, takes his prospective purchasers for a 103-mile trip, over the rough roads around San Francisco bay. One of these trips was made with but one stop, the actual running time for the trip being 4 hours 20 minutes, and so successful was the performance of the American car with which the trip was made that an immediate sale was secured.

Communications from The Manufacturer

Tests Conducted by Two Professors Show That Magnetic Speedometers Are Not Affected by Exterior Fields

CHICAGO, ILL.—Herewith are reports of two tests made on Warner and Stewart magnetic speedometers.

One of these tests recently made by Professor Carhart of the University of Michigan is very interesting and I am under the impression that it is of enough human interest to the automobile engineers about the country to merit their attention.

REPORT I—Pursuant to your request I have procured from stock in Los Angeles one Stewart and one Warner speedometer and have made thorough tests of both instruments relative to their susceptibility to change of readings through the agency of outside magnetic fields, such as that of an electric starting motor in a gasoline machine or the motor of an electric automobile.

The speedometers were driven through their long flexible shaft by attaching to the axle of a two-current generator; the revolutions per minute were measured by means of a sensitive frequency-meter connected to the alternating side of the generator. It was then necessary only to read simultaneously the scale of the speedometer and that of the frequency-meter. The readings of the two were nearly the same and any variation due to magnetism could be readily detected.

Excited Edison Machine Had No Effect

An old Edison bi-polar of .5-kilowatt capacity was employed to furnish an outside stray field. This was chosen because its stray field is greater than that of a machine of more recent make. Readings were taken with the distance between the center of the armature of the Edison at different distances from that of the speedometer up to within 10.5 inches. In no case could I detect any change in the ratio between the readings of the speedometer and the frequency-meter on account of the presence of the excited Edison machine. This statement applies to both Stewart and the Warner instruments.

I am not acquainted with any case in which the speedometer is mounted within 10.5 inches of the pole of a starting motor of an automobile, either gasoline or electric. I also tested the speedometers with a permanent magnet of the horseshoe type. This magnet was capable of holding by means of its armature a weight of a pound or more. The poles were applied directly to the case in various places. Not the slightest effect could be detected in the indications of the speedometers.

The conclusion is inevitable that the magnetic speedometer as made at the present time is not affected by the magnetic field of a starting motor nor by that of a magnet to any extent that can be detected by reading the scale.

The claim that the readings of magnetic speedometers are influenced by the currents or static effects of the ignition system of an automobile is a contingency too remote to deserve serious consideration or experimental disproof.—HENRY S. CARHART, Professor Emeritus of Physics, University of Michigan.

REPORT II—The effect of external magnetic fields upon magnetic speedometers.

1—Horseshoe magnet near the speedometer.

A Stewart instrument with split ring magnet and field ring mounted upon the testing apparatus and operated at known speeds, was exposed to the influence of a permanent horseshoe magnet capable of lifting 4 pounds. This magnet brought as close as the casing of the instrument would permit, produced no appreciable effect upon the readings.

2—An electromagnet capable of lifting 15 pounds on one of its

poles brought into like close proximity to the split ring magnetic speedometer on the testing apparatus produced no appreciable effect upon the readings.

A Stewart speedometer with closed ring magnet without field ring similarly exposed to the horseshoe magnet and to the electromagnet showed no appreciable change in its readings.

3—The effect of strong electric current around the speedometer.

A coil of thick wire was placed around the steel case of a speedometer and a heavy current from a storage battery was passed through it. The steel case of the instrument became sufficiently magnetized to lift 1 1-2 pounds. Switching this current off and on, while the speedometer was operated at known speeds on the testing apparatus, produced no appreciable effect upon the readings.

The strength of the magnetic fields passing through the speedometer due to the external magnets and the current employed in these tests greatly exceeded the strength of the fields which would be caused to pass through the speedometer by a generator or a motor mounted on an automobile at the distance from the speedometer at which such generators or motors are found in actual construction.

4—Effect of high-tension current passing through the speedometer.

A Stewart speedometer, Type B, and a Warner instrument were each in turn introduced into the secondary or high-tension circuit of an induction coil giving an intense spark 1 inch long so that the high tension current passed through the instrument while running at known speeds on the testing apparatus. Switching the spark on and off produced no change whatever in the reading of the instrument.

The foregoing test was repeated with the case of an instrument removed, so that the spark passed directly through the magnet and the aluminum cup of the speedometer, but no effect was produced upon the reading.

In these tests the disturbing influences employed greatly exceeded any disturbing influences which could be produced by stray currents or magnetic fields from a motor or a generator mounted on an automobile, even if the circuit of such motor or generator should become directly connected to the chassis or other metal parts of the vehicle.

These experiments indicate therefore, that it is impossible for a magnetic speedometer of these types to be disturbed so as to affect its readings by any influence proceeding from a motor or generator carried on the vehicle for starting or continuously operating it, or for charging a storage battery.—G. M. WILCOX, Armour Institute of Technology.

It will be obvious to you that these tests will probably upset a few stray notions, which were going around to the effect that magnetic speedometers could be affected by currents or stray waves furnished by other forces, such as close proximity to electric starters, magnetos and the like.—BERNE NADALL, Stewart-Warner Speedometer Corp.

Danger in Truck Overloading

A car driving at more than a certain speed proves beyond the control of the driver when sudden and positive stopping becomes necessary. The same holds true of the overloaded truck. It should therefore be made the business of State and municipal authorities to forbid overloading of freight automobiles as they forbid travel at more than fixed speeds. This course is the more desirable, as a large percentage of truck owners overload.

Paris now arises at 14 o'clock, France having adopted the 24-hour day after the example of Italy. If America follows the lead, the A. M. and the P. M. are not hereafter to be confounded with a university degree and the postmaster, railway timetables and score cards for 24 hour races will be simplified and the "nick of time" will be promoted from the 11th to the 23d hour.

Letters Answered and Discussed

Special Process Steel Manufacture—An Incorrect Lighting Wire Diagram—Changing the Vacuum Oil Feed—Storage Battery for Ignition—Complains of Carbureter—Value of English Imports—Use of Kerosene in Motor

Difference in Special Process Steel

EDITOR THE AUTOMOBILE:—Will you kindly let me know the difference in Bessemer and Open-Hearth steel, whether they are one and same thing, only different process of manufacture, or whether different formulas?

Akron, O.

W. C. MILLER.

—BESSEMER STEEL is made by blowing air through a bath of melted pig iron. The oxygen of the air first burns away the silicon, then the carbon, and before the carbon is entirely burned away, begins to burn the iron. Spiegeleisen or ferro-manganese is then added to deoxidize the metal, and to give it the amount of carbon desired in the finished steel. In the ordinary or "acid" Bessemer process the lining of the converter is a silicious material, which has no effect on phosphorus, and all the phosphorus in the pig iron remains in the steel. In the "basic" or Thomas and Gilchrist process the lining is of magnesian limestone, and limestone additions are made to the bath, so as to keep the slag basic, and the phosphorus enters the slag. By this process ores that were formerly unsuited to the manufacture of steel have been made available.

OPEN-HEARTH STEEL—Any mixture that may be used for making steel in a crucible may also be melted on the open hearth of a Siemens regenerative furnace, and may be desiliconized, and decarbonized by the action of the flame and by additions of iron ore, deoxidized by the addition of spiegeleisen or ferro-manganese, and recarbonized by the same additions, or by pig iron. In the most common form of the process pig iron and scrap steel are melted together on the hearth, and after the manganese has been added to the bath it is tapped into the ladle. In the Talbot process a large bath of melted material is kept in the furnace, melted pig iron, taken from a blast furnace, is added to it, and iron ore is added which contributes its iron to the melted metal while its oxygen decarbonizes the pig iron. When the decarbonization has proceeded far enough, ferro-manganese is added to destroy iron oxide, and a portion of the metal is tapped out, leaving the remainder to receive another charge of pig iron, and thus the process is continued indefinitely. In the Duplex Process melted cast iron is desiliconized in a Bessemer converter, and then run into an open hearth, where the steel making operation is finished.

The open-hearth process, like the Bessemer, may be either acid or basic, according to the character of the lining. The basic process is a dephosphorizing one, and is the one most available, as it can use pig irons either low or high in phosphorus.

Save Gas with One Headlight

EDITOR THE AUTOMOBILE:—I have recently had some long stretches of touring to do and in order to get to sleeping quarters through a sparsely populated country it has been necessary to do considerable night riding. I have found that I have been able to get along with one headlight and in this way have had my tank last twice as long as with the two lamps lit. At the same time I get a better light than if I had both lights lit dimly.

Westport, N. Y.

JOE HUNTINGTON.

Wiring of Lighting System

EDITOR THE AUTOMOBILE:—Will you please tell me if the diagram for wiring an automobile for side lamps and tail lamps and horn is correct as I wish to wire our car over, the present wiring being inconvenient owing to a change in the location of the battery from rear to front?

Prairie du Chien, Wis.

ARTHUR KNOERZER.

—This diagram is incorrect because you would be unable to blow your horn unless the side or tail light was lit. The horn circuit should not run through any of the lamp filaments. It is also improper to place the tail light in series with the horn.

Advantages of Worm Drive

EDITOR THE AUTOMOBILE:—We have had some discussions as to the drag produced in a worm-drive rear axle over the old gear and pinion and as yet have failed to notice any discussion concerning the subject in the columns of your paper. Kindly advise us as to the advantage of worm-drive over the former gear drive and why it seems to be gaining so much favor, especially with truck manufacturers.

Ashland, O.

ASHLAND AUTO GARAGE.

—The advantages of the worm-drive are silence and long life, according to the claim of those who are putting it on the market. The drive is efficient and does not become noisy with wear. Wherever there is considerable reduction between the driving and the driven member a worm is very advantageous because it is not necessary to introduce members of widely different sizes as is the case in the reduction through bevel gears. Material must be carefully selected in a worm drive so that there will be no undue amount of wear. In worm drives the wearing parts are steel against bronze. For the more expensive pleasure cars there is a possibility of its extended intro-

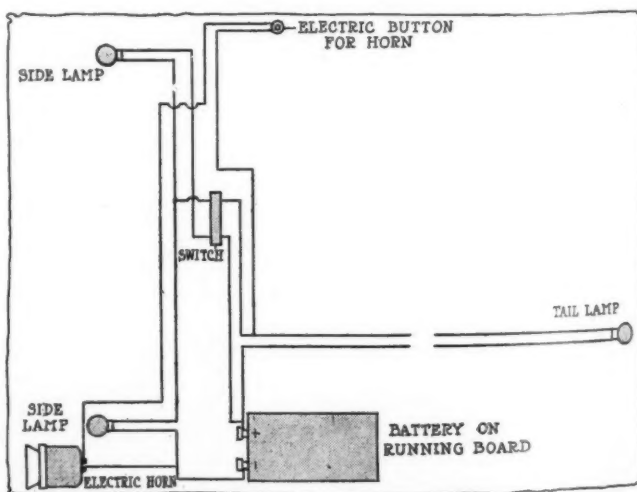


Fig. 1—Incorrect wiring diagram submitted by reader. Horn cannot be blown when lights are not lit

duction into this country because of the silence of its action. It is altogether free from the hum which is often perceptible in bevel gear drive. The makers of bevel gears, however, state that where back lash is eliminated and there is no lost motion throughout the axle the silence of the bevel gear axle is as great as that of the worm-driven device.

Use of Gum Camphor Bad

Editor THE AUTOMOBILE:—Will you kindly advise us if crystallized or gum camphor used in large quantities would have any bad effects on the internal parts of a motor, the above being mixed with gasoline?

The idea is to put more life in the present low grade of fuel, also from what proportion are the best results obtained and what would be the effects of an over dose?

Is there any other solution that you know of that would give better results than the camphor, figuring on same not being too expensive?

Philadelphia, Pa.

WILLIAM ELLERSHAW.

—It is generally a bad idea to attempt to doctor a fuel by the addition of some extraneous material. In former years racing cars and motorboats were very prone to use doped gasoline while in contests in the hope of securing better results than from the ordinary fuel. Picric acid was very often used for this purpose, but, owing to the fact that it damaged the cylinder walls, was gradually abandoned until now its use is very rare. Gum camphor has never been used to any extent for this purpose and nothing like definite information can be obtained regarding its successful use in gasoline. Camphor is not readily dissolved and the use of large quantities looks from that standpoint to be bad. As stated, it is safer to use an unmixed fuel.

Hard to Start Cold Motor

Editor THE AUTOMOBILE:—I have a Studebaker Flanders 20 1912 model equipped with their own carbureter, but it starts very poorly in cold weather and I don't think it is as economical as some others. Should I be troubled in this way?

New Haven, Conn.

FRED W. STEVENS.

—The carbureter is fitted with a tickler which if pressed should flood the mixing chamber and allow you to start without trouble. If you close the air adjustment slightly you may be able to get an easier start. According to the foreman of the repair department of the Studebaker Corporation in New York City, there are practically no complaints on this carbureter and even in the winter season 15 miles to the gallon is secured regularly. In the summer season on a warm day you will be able to better this and secure in the neighborhood of 18 or 20 miles to the gallon of gasoline.

Changing Vacuum Oil Feed

Editor THE AUTOMOBILE:—I have an E. M. F. with the vacuum system of oiling, which has never worked properly, and I wish to put in an oiling system with a sight feed, and ask suggestions from you.

My idea is to put a double glass adjustable sight feed upon the dash, and use the present 1-gallon oil reservoir on the side of the crankcase.

1—To use a hand pump by the seat to force the oil up to the sight feed, or would you advise taking the pressure from the exhaust pipe, and use a one-way valve on the pipe leading to the reservoir?

2—Would you advise using the present holes at the bottom of the crankcase for the intake of the oil to the crankcase, or would it be better to run the .125-inch pipes to the oil cups on the front and rear main bearings and the overflow running to the bottom of the crankcase for splash?

3—In using the hand pump it would be necessary to have a shut-off cock on the pipe line between the reservoir and feed so as to stop drip when not in use. By using the exhaust for pressure I see several faults. The pressure might get too great, and

the carbon from exhaust gases would get into the oil and might clog the feeds as well as fouling the oil. Although it might be convenient, would you deem it necessary to have a pressure gauge from the reservoir in connection with the hand pump system?

4—If the oil leads or pipes to the main bearings be used would not the right side be the better side for the leads to enter the crankcase and would there be danger of the pipes not remaining in place inside at the front and rear bearing cups?

5—Although I have put new bolts in my springs, there is still considerable play. Is there any other way to take this up other than having the spring-eyes bored larger and fitting brass bushings?

6—In grinding valves is a polished or dull face considered the better? Should the valve face be put back absolutely clean and dry or with a little kerosene or oil on it?

7—One year ago I put Firestone demountable rims on my car and 34 by 4-inch tires in place of 32 by 3.5 and found that I now have very little clearance under the fenders. Using 32 by 3.5-inch tires four tires, by shifting around, never lasted more than 2,500 to 3,000 miles, but by using the 4-inch four new non-skid tires ran me over 7,000 miles. I give this to show the value of oversize tires.

New York City, N. Y.

HERBERT V. W. CARD.

—The E. M. F. vacuum feed should be successful provided that the valve in the filling hole is tight and the leads to the crankcase are clean. The system which you intend to place upon your car will be very apt to be more troublesome than the vacuum feed unless the work of installing it is very carefully done. It will not be an automatic system, but hence will require attention from time to time. Referring to Fig. 2, which shows the system as it stands now, and as you suggest, the following advice may be readily followed:

1—If you intend to use this system it would be preferable to use the hand pump rather than the pressure from the exhaust pipe. Exhaust pipe pressure is unreliable as you are always exposed to the risk of leaky check valves.

2—It would be better to run the new leads to the oil cups on the front and rear main bearings and allow the overflow to run down into the splash troughs so that you can always be sure that the main bearings will have a sufficient supply of lubricant.

3—The sight feed would have to act in the nature of a gravity feed tank. The hand pump could be used to bring the oil up into this glass tank from which it would feed to the crankcase by gravity through adjustable holes which would permit the flow of oil to be more or less rapid as desired by the driver. If the device for controlling the speed of the oil flow from the glass tank could be inter-connected with the throttle, so that the wider the throttle was opened the more rapidly the oil flowed into the crankcase, the desired result would be obtained, that is, that more oil would be supplied when the engine was laboring than when running under a light load. In this way the system could be made automatic except in so far as it would be neces-

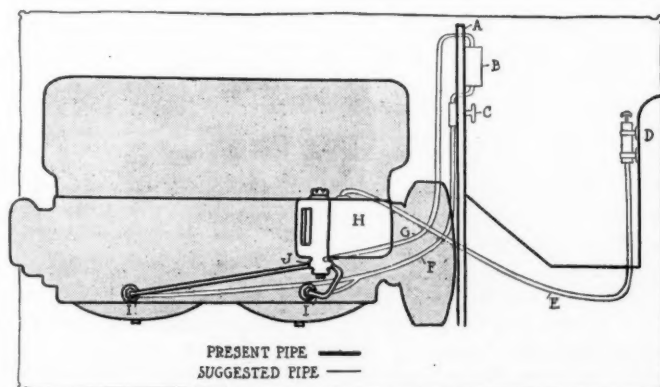


Fig. 2—Suggested oiling system to replace vacuum feed on E.M.F. car. Hand-pump located in reach of driver

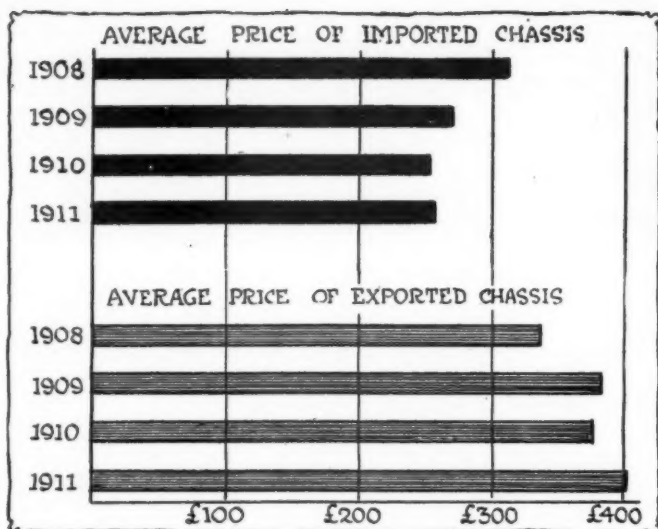


Fig. 3—Chart showing average value of English imports and exports from 1908 to 1911

sary to use the hand pump in bringing the oil from the reservoir to the glass tank on the dash.

4—It would not make any difference what side was used for the entrance of the oil leads to the crankcase. The methods of fastening the leads in place should be so thorough that there will be no danger of not remaining at the bearing cups.

5—The best method is to have the spring eyes bored larger and the brass bushings fitted. The bushings should be secured in place by a set screw so that all wear will be upon the bushing and that they may be removed readily when worn.

6—The face of the ground valve should have a polished appearance and should be absolutely clean except for a quick wipe with an oily cloth to prevent rusting of the newly ground surface.

7—Why not raise your fenders slightly by changing their curvature?

Prefers Four to Six Cylinders

Editor THE AUTOMOBILE:—In regards to the four-cylinder motor, much can be accomplished. The four is lighter than the six if not made too large and weight should be cut down. Some cars are very heavy and use a large per cent. of the motor's power to propel its own weight. The hood on some big sixes is 60 per cent. as long as the body and takes up too much room, leaving a limited space for the latter. A car of high class should be capable of carrying its load from 2 to 70 miles per hour on high gear without noise. A four-cylinder Knight motor 4.5 inch bore, 7 inch stroke as I described in my last letter would develop with steel pistons 120 horsepower and run perfectly smooth and noiselessly. When perfected the body should be made of aluminum with adjustable seats. These would be greatly appreciated on long tours. Light-weight cars would not get mired so often on soft country roads and would be much easier to operate.

Alton, N. H.

H. P. TIBBETTS.

Valve-In-Head Efficiency

Editor THE AUTOMOBILE:—Will you kindly tell us why a valve in the head motor produces more power than an L-head or T motor of the same bore and stroke?

St. Charles, Mo.

ST. CHARLES GARAGE.

—The reason that the valve-in-the-head motor has advantages over other types is because the combustion space can be more advantageously shaped. If it were possible to make the combustion space a perfect hemisphere the best possible results would be obtained. As it is, however, we are compelled to depart from this form of combustion chamber for practical reasons, among which is the location of the valve. In an L-head motor the de-

signer is compelled to use a port to one side of the combustion space which departs quite radically from the hemispheric form desired, but which, however, renders possible the use of a very simple valve action and avoids the use of long push-rods and parts which tend to become noisy after use. Valve-in-the-head manufacturers who succeed in getting a good valve action which will remain permanently sound and who are able in this manner to take advantage of the nearer approach to the ideal combustion space have secured a very desirable feature from the internal-combustion motor. The T-head motor, of course, has the same problems to face as the L-head. That the power loss is not very serious may be illustrated by the fact that the stock car which won the championship of America during the 1911 racing season was of the T-head type. The use of the valve-in-the-head or other type of motor has been argued pro and con for a number of years and the advantages and disadvantages of both types have been given as outlined above. There are, however, at present many successful manufacturers of both types. This alone will signify that both types have their advantages and disadvantages and that the latter are not serious enough to militate against the successful manufacture and operation of either type.

Using Storage Battery Ignition

Editor THE AUTOMOBILE:—I have a Cadillac 30, 1911, on which I am about to install an electric lighting outfit, consisting of dynamo and storage battery of the 6-volt type. Can I connect the Delco wires to storage battery and discard dry cells?

Will this system work O.K. without harm to the controlling relay?

Perry, N. Y.

DELCO.

—The storage battery may be used for the ignition system without harm, provided it is of sufficient capacity. You will need an 80 ampere-hour 6-volt battery. What you are doing is simply adding the remaining units of the lighting system. On your car you have merely the Delco ignition. There will be no difficulty with the control, relay or any other parts if you install the remaining units in the same manner that any of the generator battery sets are fitted. It must be remembered that you need a controlling device which will prevent the voltage of the generator from mounting too high at great engine speed and which will prevent the battery from discharging back through the generator when the voltage of the latter becomes less than that of the battery. These systems may be bought complete and installed in many different ways. The most satisfactory manner, however, where the generator is not already fitted to the car is to drive this unit from the pump or magneto shaft of the motor. It can be done by silent chain without a large expense and the resulting installation will be noiseless and permanent.

Sparks Appear in Safety Gap

Editor THE AUTOMOBILE:—Would a poor mixture cause sparks to appear in the safety gap of a magneto, or is there only one cause for it—the secondary current having no outlet?

2—Is it your opinion that the use of a spark-plug air pump is harmful to the motor in any way?

New York City.

A READER.

—I—No, not this alone, although a poor mixture might bring a condition about that would constitute a secondary cause of a spark in the safety gap. The theory of the spark gap is that as long as a circuit is provided through the cables and spark-plugs, the current will not jump the wide gap on the magneto, but if the spark plug circuit be broken, and the engine continues to turn the magneto, generating a high-tension current, it is allowed to escape across the safety spark gap, and thus prevent the burning of the windings. A rich mixture might so carbonize an engine that pre-ignition would result. If this pre-ignition occurred at the time that the spark was about to jump the spark-plug, the increased pressure might constitute such a resistance to the electrical passage that it would jump the safety gap instead. Again, an abnormally rich mixture might cause the motor to overheat to such an extent that the sparking points

would become warped, and the gap increased so that the current would find a more ready passage across the magneto spark gap than that of the spark-plug. These conditions would be more likely to obtain in a single-cylinder motor than a multiple-cylinder type, as it is highly improbable that a given mixture would produce the same results in say, four different cylinders with four separate plugs.

2—The types that have come to the attention of THE AUTOMOBILE have not been of such nature as to be conducive of harm to an engine, except the slight wear due to running with one cylinder missing, which, however, is almost negligible.

Wants Starter for Ford

Editor THE AUTOMOBILE:—I own a Ford car, which I stop and start over fifty times daily. I think a self-starter would save its price in time saved over cranking by hand. I wish you would suggest to me the starter I need. The car starts easily, so I had in mind a spring starter as the easiest and cheapest to operate. Do they give satisfaction? Do they easily get out of order? Do they automatically wind themselves after starting the engine?

Needham Heights, Mass.

HARLEY E. CRISP.

—A spring starter would give you satisfaction. With a light car such as the Ford they should not get out of order readily. The general operation of these starters is as follows:

A button or lever is operated from the driver's seat. This automatically releases a coil spring which actuates through some mechanical means the crankshaft of the motor. When the cylinder explodes, the operating device is disengaged from the crankshaft. The next few revolutions of the motor rewind the spring and it is then ready for another start. The objectionable feature of the spring starter is not up to the starter itself but the operator. Many people are in the habit of absent-mindedly attempting to crank the motor without first switching on the spark. When this is done with a spring cranking machine it means that in a few moments the spring is unwound and the operator has the irksome task of rewinding it. On your Ford car a spring starter should be a success.

Cars Imported Into England

Editor THE AUTOMOBILE:—Kindly tell me what is the cost of cars imported into England. Are they of the high-priced or low-priced class? I should also like to know if possible the average value of the chassis exported from England. I should particularly like to know how the exported values compare with the imported values for each chassis.

New York City.

K. SMITH.

—The chassis of the chart, shown in Fig. 3, will give the average values for the last 4 years in a better way than would figures. It will be noted that the average price of the imported chassis dropped quickly between 1908 and 1910, but that in 1911 it was about the same as 1910. The average value of the exported chassis has been climbing steadily.

Use of Kerosene in Motor

Editor THE AUTOMOBILE:—For the last 3 years I have been giving the subject of kerosene carburetion considerable thought and time studying the conditions under which kerosene operates best. I have developed seven distinct kerosene systems and subjected each to dynamometer tests under various loads and at various compressions, thereby obtaining graphical curves from each system under all conditions. As a result of these tests I have developed the Aultman & Taylor kerosene tractor, which can operate on kerosene quite as well as on gasoline, when once the surfaces of the cylinder walls are given an initial warming, which is done by priming with gasoline, having received quite satisfactory efficiency from the engine in the tests.

I am able to install on engines of good design a system for the use of either kerosene or gasoline simply by throwing a three-way valve one way or the other. I find that an engine

must have a scientifically correct manifold in order to distribute the lighter and heavier oils (vaporized and unvaporized kerosene) equally to all cylinders and as a considerable percentage of automobile motor designers today pay little regard to this most necessary virtue it is necessary to take each particular type of motor and so change the design as to take into account these necessary features.

I find that any four-cycle gas engine when properly equipped will operate quite as well on kerosene as when on gasoline. The only trouble whatever is getting the engine warmed up, which difficulty has been surmounted by arranging to start on gasoline and after 1 minute turning on the kerosene. The great trouble heretofore has been due to the fact that kerosene leaves an excess of carbon deposit both in the combustion chamber and under the rings, which causes the rings to stick and forces them harshly against the cylinder walls. This trouble has been entirely avoided by water injection. A test which was conducted in the laboratory of the Aultman & Taylor Machinery Company by the writer, extending a solid week, at various loads, averaging 55 horsepower throughout the week, showed how complete was the combustion and how thorough the scavenging. At no time was it necessary to even clean the spark-plugs, and upon the completion of the test the heads were removed, the pistons taken out, the valves inspected, and there were no signs whatever of any bad effects from the use of kerosene. In fact, the combustion chambers were bright and the spark-plug porcelains were of a brownish white color, showing only the effects of the intense heat.

I predict that within 2 years all stationary engines, heavy-duty tractors and motor trucks will use this cheap 44-degree Beaumé coal oil exclusively, while the pleasure vehicles will use lighter kerosene of about 50-degree Beaumé. Gasoline costs 17 cents wholesale in Mansfield, while 44-degree coal oil costs 8 cents and 50-degree kerosene costs 9 cents. Each contains approximately the same British thermal units per pound, and as a gallon of 44-degree kerosene contains 6.5 pounds, against 5.8 pounds for gasoline, it can be seen that gallon for gallon kerosene contains 6.5 to 5.8 more heat energy. But, owing to the peculiarities of kerosene, an engine is not quite as efficient thermally on kerosene as on gasoline, owing, no doubt, to the fact that small globules of kerosene get into the cylinders without being vaporized and supplied with the necessary oxygen for combustion.

Mansfield, O.

E. FIELD WHITE.

—In response to a request from the Editor of this department Mr. White has furnished the curve shown in Fig. 4 which gives the comparative efficiency of kerosene of 44 Beaumé test and of gasoline of 64 test. These were taken to determine the least possible fuel consumption at each load. It will be seen that a very low consumption was obtained by running at about 80 load and throwing the throttle wide open, then reducing the speed with the needle valve to give a very lean mixture. The horsepower was boosted by giving a rich mixture, thus causing the curve to ascend to the maximum horsepower.

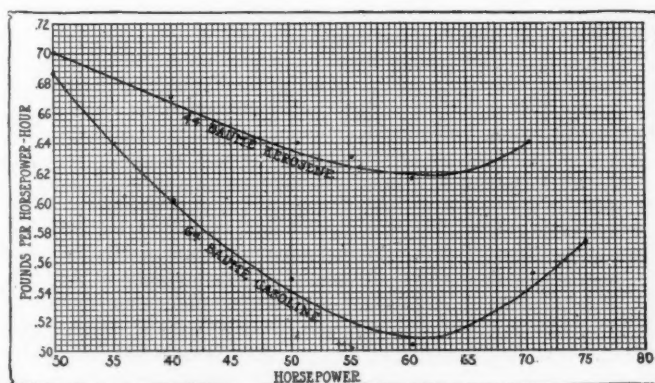


Fig. 4—Comparative consumption per horsepower of kerosene and gasoline in Aultman & Taylor tractor



Showing the way the top folds into the body on the Turcat-Mery torpedo and baggage and spare wheel compartments

Turcat-Mery Torpedo Has Unusual Baggage Facilities

LONDON, ENG.—Many of the problems of luggage carrying have been solved in a torpedo body built by the Turcat-Mery Company on one of its 30-horsepower chassis. As can be seen from the illustrations, the car has really a double width, the side panels being swept out so as to incase the running boards, leaving a locker space all round between the seats and the outer paneling. On the right-hand side of the car there is a particularly big space for personal baggage, for as no entrance has to be provided to the driver's seat from the right, the running board is used for carrying three or four large size grips, which are put in position after removing a side panel. On the opposite side the same amount of space is not available, owing to a door having to be provided here. There is, however, on the running boards a series of cabinets placed between the two doors and having sufficient capacity for all the mechanical spares likely to be required for a long journey.

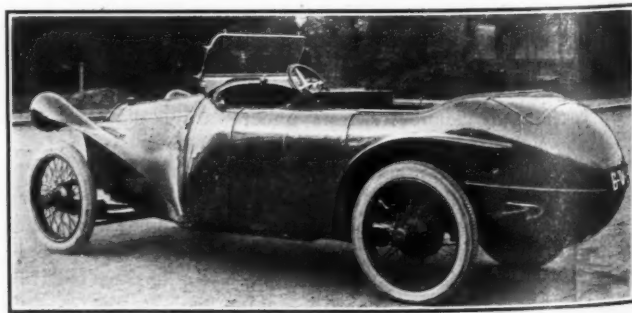
When the two rear doors are shut, the running boards within them become available for baggage, which is fully protected from the weather. In the egg-shaped tail there is room for a couple of spare wheels carried upright, and, of course, fully protected. To the rear of the wheels, in the extreme end of the tail, there is space for a large number of light articles.

The top lets down into the rear compartment. There is nothing very distinctive in the top itself, but it is hinged in such a way that when lowered it is between the two shells forming the body. The front hoops have a polished beading which completely covers up the space provided for entering the top between the two shells. Although completely out of sight when lowered, the time required to lower this top is no greater than with the ordinary type of external top. In accordance with modern practice, there are no straps for the top, the attachment being made direct to the windscreen. In addition to having great luggage

capacity this car has an unusually clean underpan. At the midships section the pan is carried full out to the extremities of the running boards, and not to the frame members, as is usual. At the front end it is run up to join the lower ends of the fenders. Despite its greater width, the car offers considerably less resistance than an ordinary type of touring car with external fittings.

An idea of the external appearance of the car may be gained from the accompanying illustration showing the machine with compartments all closed in readiness for a trip.

The illustration at the top of the page shows the manner in which this novel body construction is adapted for carrying a great many things concealed from view which are generally fitted to the outside of a car in such a way that the effect of the body design is practically destroyed. The upper pictures show the way the top folds into the body while the lower illustrations show the method of carrying baggage and spare wire wheels.



Turcat-Mery torpedo, showing clean-cut lines combined with unusual baggage-carrying capacity



The Clement-Talbot on its world's record attempt, travelling at a speed of over 103 miles per hour on the Brooklands track

How the Clement-Talbot Racer Made Over 103 Miles in an Hour

LONDON, ENG., Feb. 22—The Clement-Talbot car which a week ago established a new world's record on the Brooklands track by traveling 103 miles 1470 yards in 1 hour has since that date been the center of motoring interest because of the phenomenal speed and the small power of the car.

The Clement-Talbot is a four-cylinder car, 101.5 by 140 millimeters bore and stroke. In inches these measurements are 4 by 5.51. This motor has a most enviable power curve, which is practically a straight line from 25 horsepower to 120. It generates 20 horsepower at 500 revolutions per minute, and 120 horsepower at 3,000 revolutions per minute. This is an ideal motor performance in that when the crankshaft speed is made six times as great, the horsepower is increased sixfold. It also means that for all intermediate crankshaft speeds the production of horsepower is in direct proportion.

In the current issue of *The Autocar* the valve timing of the motor is given. It shows the intake valve opening 14.5 degrees after dead center and closing 30.5 degrees after bottom dead center, its period of opening being approximately 195 degrees, 360 degrees constituting an entire circle. The exhaust valve

opens 46 degrees before bottom dead center and closes 9.5 degrees after top dead center. There is a period of approximately 5 degrees between the closing of the exhaust and the opening of the intake valve. The magneto was so set during the performance as to give a maximum advance of 40 degrees before the top dead center.

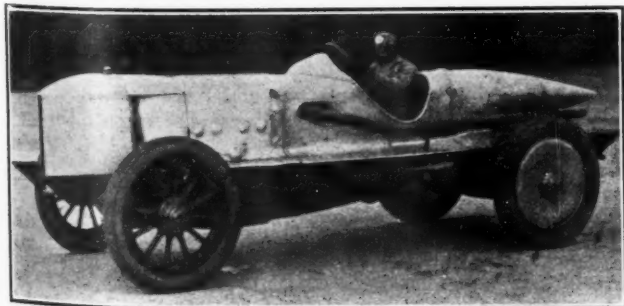
The Clement-Talbot motor was designed by George W. A. Brown, a comparatively unknown internal-combustion engineer. While not identified publicly or conspicuously, he nevertheless has been a close student of motoring and one who has gained much of his information from practical experience with cars on the road. He is looked upon as one of the best authorities on tuning up an automobile in the English industry.

Looking to the future, the next great performance of this character will be 120 miles in the hour. But it is not probable that this will live as long in the memory of the public as the present record. A remarkable feature of the achievement is the small size of the engine. A year ago the best speed for a 4-inch engine was 87.99 for the flying half mile. Interest centered in the way the Talbot car came off the banking each time in its attempt to cover the century in the hour and in the elaborate and successful signaling devices.

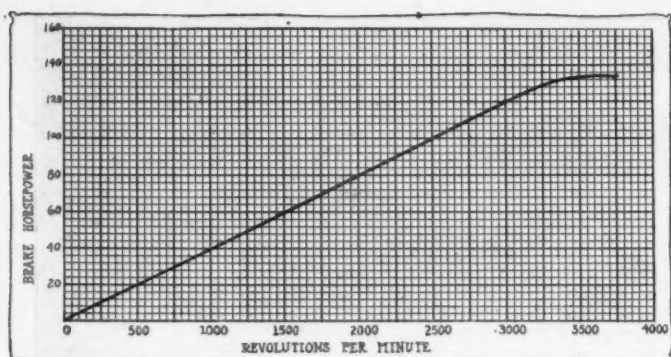
Large panels of three-ply wood, about 3 by 3.5 feet, were provided having on one side a red number and a white one on the other. If the car had covered 97 miles an hour in any lap the driver would see a red 7 when next he passed the stand, and if he made 103 he saw a black 3. The red numbers were not needed at all.

There was also a large dial marked out for the run. Every time a lap was covered a hand on the dial was advanced a section so that when the race was over the hand had completed its circuit. Such provisions as these are of great help to the driver in endeavoring to better a world's record.

The Clement-Talbot car, of 25.6 horsepower, has an engine capacity of only 4,531 cubic centimeters, is owned by the Earl



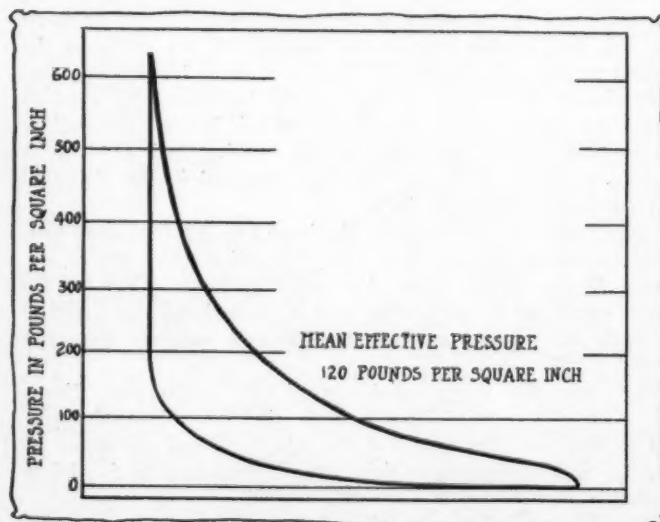
Percy Lambert at the wheel of the 25.6-horsepower, record-breaking Clement-Talbot waiting the signal to start



Brake horsepower curve of the record-breaking Talbot motor

of Shrewsbury and was driven by Percy Lambert. The car really covered over the distance of 103 miles 1,470 yards, the distance recorded, for the car kept to the outside of the timing line, which at least would mean another 70 yards per lap, so that actually the car attained the wonderful speed of 105 miles an hour, which speaks well of the advance in the design and construction of motor vehicles.

At the start there was an absence of wind, but in its stead there was a dense fog overhanging the track, rendering it impossible for the driver to see more than a quarter of a mile or so in front of him, while he stated that for five laps he could hardly see at all. This fog kept the tires cool, and at the conclusion of the run the tires were measured and it was found that the total reduction of the center rib on the off front tire amounted to 1 millimeter; the near front, 2 millimeters; the off back, 1.1 millimeters, and the near back, 1.4 millimeters. No preliminary run was made, and the first lap was covered at the rate of 87.38 miles per hour from the standing start, which is much slower than the first lap of last week's attempt. However, as the motor warmed to its work and the carbureter began to settle to its labors the speed increased to 103.76 miles per hour for the second lap. The car thus succeeded in establishing class records, and at 50 miles began to put up fresh figures for world's records. The 50 miles were covered in 29:25, equal to 103.3 miles per hour, and the 100 miles were covered in 57:49.38. Continuing to travel at this pace for 60 minutes it was found that the actual distance covered in the hour was 103 miles 1,470 yards. Last week, it will be remembered, that it was stated in these columns that the car would cover the 100 miles in about 58 minutes, and it will be seen from the above that that statement is correct within 11 seconds. The car increased in speed as the distance lengthened and at the conclusion seemed to be fit for a further gruelling. The previous figures for the world's record of 100 miles was 1:1:27, compared to 57:49.38.



Indicator diagram of Talbot 25.6 horsepower motor

Benz Wins at San Diego

Carlson Covers 5.9-Mile San Diego-Point Loma Course in 200:9.2—Buick Wins Small Car Race—Two Wrecks

SAN DIEGO, CAL., March 1—(Special Telegram)—In the race over the San Diego-Point Loma course today, a Benz, driven by Carlson, finished in 200:9.20 as the winner in the large car class, while the honors in the small car division went to Campbell in a Buick. The course of the road race is 5.9 miles in length and 34 laps were run in both the large and small car division, making the total distance 200.6 miles. In the small car division, Campbell's car was the only one which finished, while in the other division a Stutz, driven by Cooper, finished second.

The thrill of the day came when Jeannette's Benz, in the big car race, was wrecked during the fourth lap as the car threw two tires; the driver and mechanic being injured, but not fatally. A Mercedes driven by Compton was also wrecked due to tire mishap.

In the small car race, Buick (Roberts), Regal (Brown) and Studebaker (Shannon) dropped out in the fourteenth, tenth and second lap, respectively. A Buick for which Nikrent had been scheduled as the driver, did not start. In the large car race, a Buick, driven by Alexander, was flagged third when completing the sixteenth lap. A Stutz (Westburn) dropped out during the twenty-first lap.

Indiana-Pacific Starts July 1

INDIANAPOLIS, IND., March 3—It is expected that the Indiana tour to the Pacific Coast, which will start from this city on July 1 and which will take 17 days until the tourists reach Los Angeles, will be the great touring event of the coming season.

By leaving Indianapolis on July 1 it makes the Sunday stops fall consecutively in Kansas City, Denver, Salt Lake City and San Francisco. This also gives the tour great prominence on the day of leaving, and on July 4 in running from St. Louis to Jefferson City it will be the greatest event of the day.

The route has not as yet been definitely decided. It will take the tourists from Indianapolis to Kansas City via Springfield, Ill., St. Louis and Jefferson City. From Kansas City to Denver there is a choice of two routes, one by way of Omaha, the other straight across. From Denver there is also choice of two routes to Salt Lake City—the Midland trail by way of Colorado Springs and Grand Junction, and the Overland trail, via Cheyenne and Laramie. From Salt Lake City the tour will go to Frisco, thence down the coast to Los Angeles.

On seventeen nights the tourists will camp and arrangements for sleeping, lighting, eating, guarding and sanitation are being made. The sites will be selected by the pilot, who will go ahead of the tour each day and who is well able to select suitable locations. The average mileage will be from 125 to 150 miles per day.

Three passenger cars or less, forming a team, may be entered by any company for \$100. The same applies to trucks. A company entering both the pleasure car and truck division will be charged \$150. Indiana accessory makers may enter three cars or less for \$100, and, if any car of the make entered is already on the list, only \$50 will be the fee.

RACINE, WIS., March 5—The automobile department of the J. I. Case Co. is constructing two new racing cars of 450 cubic inches piston displacement, especially for the 500-mile race to be held at Indianapolis, May 30. Two small cars are also in the course of construction as well as a big free-for-all machine of unlimited piston displacement.

Preparing for Grand Prix

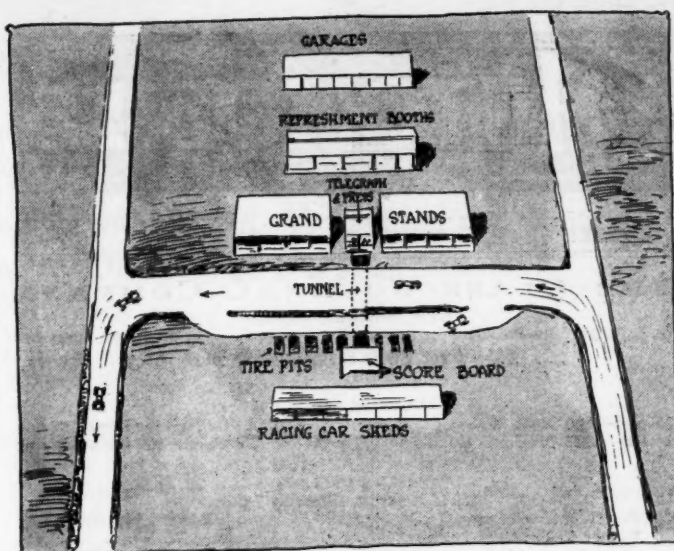
Cars Will Race Over a Distance of 57 Miles—Repair Track for Cars Making for the Pits

PARIS, Feb. 22—An unusually attractive scheme has been adopted for the arrangement of the grandstands and the tire pits at the next French Grand Prix race. The two main legs of the course, being almost parallel for nearly a mile at the Amiens end, and only 130 yards apart, will be united by a special cross road with a cement surface and a slight amount of banking. The main roads have a width of 16 feet; the cross road measures 26 feet at each end and 36 feet along the center portion. All the land between the two main roads has been purchased by the Racing Board of the French club; thus it is intended to build a permanent cross road and erect grandstands and offices of an elaborate nature. On the outside of the cross road will be the two main grandstands with the Press stand and telegraph office in a central position between the two. Behind these buildings will be the dining hall and refreshment booth, and further to the rear the private and public garages. On the opposite side of the cross road, and immediately in front of the grandstands, will be the line of tire pits, with the scoreboard behind them and further in the rear a set of boxes in which the cars will be kept under guard after being filled up with the necessary amount of gasoline for the race. In front of the line of pits there will be a special track onto which the cars can pull for repairs, thus leaving the full 36 feet road available for cars going by at speed. The earth dug out of the pits will be carried across the road and dumped on the outside of the cross road, thus forming a safety zone into which any car can run without danger to the public if it should get out of control. It has not been possible to make a very high banking safe for the highest speeds, but it is calculated that cars can take the bends at 50 miles an hour without any danger. The view from the grandstands will be directly onto the pits and the whole of the cross road, and also a clear view 700 yards in length on the two main roads approaching and leaving the grandstands. The grandstands being on the outside of the course can be reached at any time while the race is in progress, and being only 3 miles from Amiens and half a mile from a trolley car terminus, immense crowds can be handled with ease. There will be a tunnel under the cross road opposite the grandstands and a series of foot bridges at various other points will give access to the inside of the circuit while the race is on.

Careful measurement shows that the distance round the course is exactly 19 miles. It is probable that the cars will have to cover thirty rounds, giving a total distance of 570 miles. On the day following the big car race there will be a motorcycle race in the morning and a cycle car and side car race in the afternoon. These machines will use a shortened course with the same cross road, grandstands and tire pits, the distance round being 10.8 miles. The motorcycles will cover twenty rounds, or 217 miles, and the three and four-wheel machines fifteen rounds or 158 miles. The number of entries is limited to seventy for each race; it is expected that the limit will be reached.

Peugeot and Sunbeam Preparing

PARIS, Feb. 22—Peugeot and Sunbeam having decided to run in the 500-mile race at Indianapolis on Decoration Day, the preparation of the machines is being hurried forward so as to leave nothing to chance. The six-cylinder Sunbeam has been stripped of its Brooklands racing garb and fitted with two seats side by side and a big gasoline tank in the rear. Louis Coatalen, the designer of the car, took the racer to Brooklands this week



Cross-road and grandstand scheme for French Grand Prix

and had it tried out by Crossmann. Despite unfavorable conditions, the Sunbeam showed a speed of 94 miles an hour. After slight changes it will again be taken to Brooklands track and tried out by Albert Guyot, who is scheduled to drive the car in the American classic. It is the intention of Guyot to leave France with the racing car early in May so as to have sufficient practice on the Indianapolis Speedway before starting in the race.

At the Peugeot racing department the big four-cylinder racers are being modified under the direction of Georges Boillot, the head of the team. At present these cars have a bore and stroke of 110 by 200 millimeters, or 4.3 by 7.8 inches, which gives a cylinder area of slightly more than the 450 cubic inches allowed under the racing rules. It has therefore been decided to cast another set of cylinders with a slightly smaller bore to fit the limit exactly. No other features of the car will be changed. It has been definitely decided that Zuccarelli and Jules Goux shall be in charge of the two Peugeot racers. All three Frenchmen are making their first visit to America.

The driver of a taxicab within the Metropolitan District of London cannot be compelled to drive for more than 6 miles, and if hired by time cannot be made to drive for more than one hour.

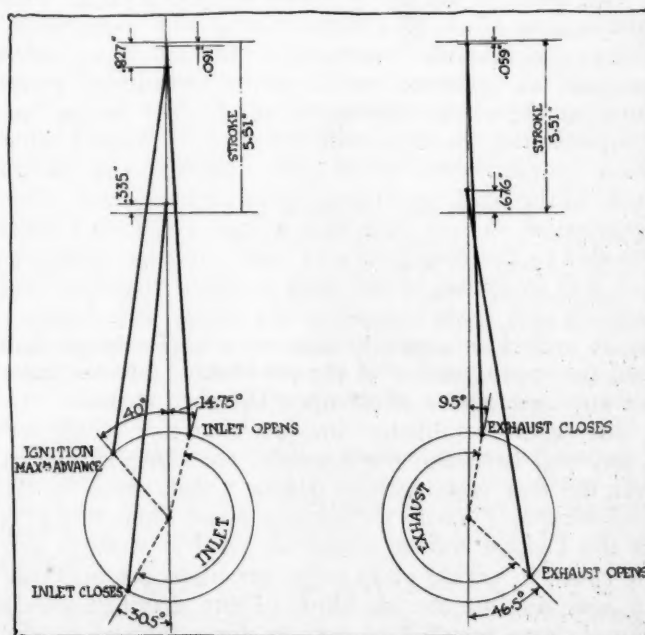


Diagram illustrating operation of inlet and exhaust valves of Talbot



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The Emery in Road Races

DOES a well-balanced properly driven high-powered racing automobile destroy road surfaces when driven at speeds of 60 miles an hour or over as is the rule in modern contests?

This question was partly answered by G. Lumet of the Automobile Club of France during the 1912 Grand Prize races over the Dieppe circuit in France, on which occasion an accurate record of the amount of travel done on the circuit during the 2 days of racing was compiled, the speed at which the cars traveled tabulated, and, at the end of the race, a careful examination made of the road conditions on the entire circuit. This examination showed that with a total of 28,267.5 miles traveled by the racing cars, of which mileage over one-half was in excess of 60 miles per hour that the road suffered very little because of the races. Mr. Lemut's report proves conclusively that on a perfectly smooth road the speed, weight of the car and horsepower have not any destructive effect upon the road surface.

The report establishes the fact that if a racing car is not well balanced, for example, not sufficient weight over the rear wheels, there will be a destruction of the road surface. Where the surface was broken at points on the Dieppe course where the road is straight and the speed in excess of 75 miles per hour, the breaking up was due to the skidding of the driving wheels caused from insufficient weight for adhesion to the road surface in proportion to the horsepower of the

motor. This same fact has been demonstrated time and again in America and those racing drivers that have been most successful in victories have attributed not a little of their success to the careful balancing of their cars so that the car hugs the road irrespective of the speed at which it travels. For racing cars to obtain the best results the weight on the rear wheels must be such that the driving wheels cannot skid at high speed on straight-away stretches. This is necessary not only for the preservation of the roads but also for the preservation of the tires.

Mr. Lumet's report further shows that there are parts of a road-race course in which the road surface is more or less destroyed by the racing cars. One of these places is at the bottom of inclines just where the speed was changed for the up-grade. Variations in speed are shown by these examples to have a destructive effect on the surface, and for road economy not only in racing but in the touring car field there is a necessity for a gradual change of speed when shifting gears.

This report is ample proof of the necessity of car manufacturers giving more attention than ever before to the question of proper balance of the car for road use. There is not an engineer or owner but is familiar with the difference in riding in cars of different makes, some of which adhere to the road surface better than others. Often it is the faster car that rides the smoother, holds the road surface better, and consequently is more economical on tires and less destructive to the road.

These are days when the question of road-destruction must be given serious consideration. To-day France is agitating an additional tax on motor cars, due to road destruction and at the same time she is cutting down her taxes on unimproved lands. This would appear to be a most unbusiness-like action, but the government feels such is imperative. Much of the road destruction by the automobile is directly due to the methods of French driving, namely, high speeds with poorly balanced cars, and not infrequently cars in which the weight over the rear wheels is not sufficient to prevent skidding, and consequent road and tire destruction.

Agitations are becoming more general in America for increasing the annual tax on the automobile in order to pay for roads. The manufacturer can to a considerable extent avoid this if he will give due consideration to the question of not only proportioning the weight properly over the front and rear wheels, but also if he will do his part to discourage the unnecessary speedy acceleration which has been pushed to the front so much in selling arguments during the last 2 or 3 years.

This report is one more argument for the construction of roads intended for motor traffic, instead of roads built specifically for neither horse or motor use. Roads built for motor cars will endure with rational driving so far as acceleration, speeding and braking are concerned. It is only when extreme carelessness in these matters, coupled with poorly-balanced cars, are combined that disaster follows to the modern road. It is going to be well-nigh impossible to maintain any type of road in good condition with mixed horse and motor traffic. It is the combination of the two that produces the injury.

The Principles of Scientific Management

There Must Be a Complete Mental Revolution on Part of Workman and Employer —All Labor Troubles Due to Division of Surplus

From an address delivered by Frederick W. Taylor, before the Canadian Club, Toronto, Ont.

WHAT is scientific management? It is not any efficiency device for increasing output; it is not a bonus system; it is not a cost system; is not motion study or time study; it is not unloading a lot of blanks at the goods entrance and saying, "There is your system, go ahead and use it." Most people think of it as one of these things. Scientific management cannot and does not exist until there has been a complete mental revolution on the part of the workmen and the employer, and until this great and complete mental revolution has taken place, scientific management does not exist.

Part of the cost of manufacturing is the cost of material. Another part is the cost of production of the article, and a third is the overhead expense. The difference between the sum of these three and the selling price is the surplus. All labor troubles are due to the division of this surplus. The workmen desire as much as they can get in the form of wages, etc., and the owners as much as they can get in the form of dividends. Under scientific management they have ceased combat over the division of this surplus. The result has been a surplus so large that both contenders get more than they ever received before. The workmen get at least 33 per cent. more wages, and the company gets larger profits. This is one result of the mental revolution.

The Four Principles

The delusion is almost universal among workmen that the division of the surplus in the past has been entirely wrong; that the working men are not getting their proper share of the general profits of capital and labor. Although in some cases it is true, their feelings have been rashly augmented by the labor leaders, newspapers and the public. In an article on Division of Capital, in the *Atlantic Monthly* of June last, Norman Faig showed their conviction to be wrong. All that the working man can ask for is that the profits that accrue to capitalists should come to the people of the United States. They themselves could not demand all this profit. If it should be divided in the manner suggested there would be 13 cents per day per man as dividend. It shows conclusively that the hope of the workman does not lie in the division of capital. It lies rather in an increase of output.

The speaker outlines the older type of management where, for example, 500 to 1,000 men in perhaps twenty different trades have acquired their knowledge, not by books, but by observation and by traditional word of mouth. This is just the condition that obtained in the Middle Ages, and still largely obtains. Yet, in spite of lack of progress his trade is the workman's greatest asset. To achieve the best results one realizes that he must get the initiative of his workmen, but one's realization of soldiering forces him to the conclusion that to render this initiative the workman must receive a larger remuneration than his competitors. The employer who has the pluck to do this, and to continue doing it, will find that his men will respond to such good treatment. This is the highest type of management under the old system, yet it cannot compete with scientific management, for under the latter there is no spontaneity on the part of the workman, but continuous effort. This, because of the new and unheard-of burdens which the management assumes.

The first of these principles is the gathering-in of the great mass of traditional knowledge held by the workmen; recording it and reducing it to laws, rules and mathematical formulas. These deductions become of immense assistance in increasing the output. Rule-of-thumb knowledge is replaced by science.

Secondly, it becomes the management's duty to study carefully every man in the plant, his capacities, possibilities and limitations; and to train each to the highest class of work for which he is shown to be fitted—progressive selection and progressive study.

Thirdly, the science and the scientifically trained man are brought together. This is difficult. It can be accomplished only by binding the workman to work by science. This, however, does not cause appreciable trouble. Nine-tenths of the trouble experienced comes from forcing the management and owners to assume *their* burdens.

And, fourthly, a great mass of work formerly done by the workmen is now partly taken over by the management, until the whole is more equally divided. On the management's side there is generally one man for every three workmen.

These principles are deduced from years of study and work under scientific management. The system is no longer something which might be found beneficial if tried—it has been well tried—and pays.

A careful study and series of observations in a plant where 400 to 600 shovellers were employed resulted in a reduction in the cost of handling iron ore from 8 cents per ton to less than 4 cents, after paying the workmen employed 60 per cent. higher wages, establishing a labor office, employing teachers to instruct the men how to scientifically handle a shovel, and timekeepers, etc., to record performances.

Investigation showed that the loads upon shovels under old methods varied from 3.5 to 38 pounds. Placed on a scientific basis, a load of about 21 pounds to the shovel, proper motions, simple and untiring, the work was now being done by 140 men. Furthermore, investigation into their private affairs showed the workmen to be living better lives, in every way, than before.

The Power of Scientific Management

Illustrations were also given in the operation of machinery. The speaker claimed that not one in fifty of the machines in the factories of America are speeded accurately. The majority of them are 200 to 400 per cent. out, and from two and one-half to nine times as much work could be done by them if they were properly adjusted. In the work of the high-class mechanic science is so great a factor that he cannot gain the proper knowledge of himself.

I know of one case in machine manipulation where mathematicians were confronted with a problem involving twelve unknowns, and struggled with it for 18 years. Now the problem is solved in 20 seconds on a slide rule taking care of the twelve variables.

"If you are willing to pay the price in time and hard work, things that have through the ages been termed impossibilities can eventually be solved and put to use for the good of man."

Waltham-Keene Decision

Judge Ray Draws Line Between Contract and Dealer's Sale License

By George Cooper Dean

THE decision of Judge Ray, sitting in the United States District Court for the Southern District of New York, in the case of the Waltham Watch Co. vs. Charles A. Keene has created something of a sensation among prominent members of the patent bar, apparently more by reason of what the judge says than by reason of what was decided in the case.

Most of the facts were stipulated by the parties and are set forth in the opinion. The Waltham Watch Co. sold watch movements conditionally with a right to recover the goods in case of a breach of conditions, the principal condition involving the fixing of the retail sale price to users. Keene bought movements from outside jobbers or dealers and resold at cut prices. The Waltham Watch Co. instead of seeking to recover the goods, as provided for by the contract, sued Keene for infringement of some patents covering only the frame and spring barrel of their watch movements.

The conditional sale contract of the Waltham Watch Co. was in the form of a notice inserted in the package in which each movement was packed. The form is as follows:

WALTHAM CONTRACT NOTICE.

16 size Waltham movement No. —, bearing the trademark RIVERSIDE. 19 jewels, essential parts of which are protected by United States Letters Patent, is sold subject to the following conditions, which every buyer thereof by accepting this movement agrees with the undersigned company to keep and perform, viz.: (1) Jobbers may sell this movement to established retail watch dealers, except those designated by this company, and to no other persons, and only at the price and discount authorized by this company. (The term "retail watch dealers" shall include all watch dealers other than those recognized as jobbers by this company); (2) Jobbers must in every instance deliver this contract notice with the movement; (3) Retail dealers may dispose of this movement by sale only, and only to buyers for use and not for resale and must not advertise nor sell this movement for less than \$25.00. A breach of any of these conditions shall revert in the company the title to this movement and upon tendering the price paid therefor to the holder thereof the company may retake possession of the same.

These conditions will be enforced by the company.

WALTHAM WATCH COMPANY,
Waltham, Mass.

The invoice had annexed or printed to it the following:

CONDITIONS OF SALE.

(Bill to Jobbers)

Each Waltham movement and Waltham watch in this bill is sold subject to the following conditions and to those in the Waltham contract notice issued with the movement or watch, which conditions every buyer thereof by accepting said movement or watch agrees with the undersigned company to keep and perform, viz.: (1) Jobbers may sell said movements or watches to established retail watch dealers, except those designated by said company, and to no other persons, and only at prices and discounts authorized by said company; (2) Must bill said movements or watches only on billheads approved by said company and bearing the condition of sale; (3) Must not bill said movements or watches with any other goods; (4) Must not exchange said movements or watches for any other goods whatsoever; (5) The Waltham contract notice must be delivered with the movement or watch in every instance.

These conditions govern the sale of the following movements: VANGUARD, 18 size and 16 size; CRESCENT ST., 18 size and 16 size; No. 845; APPLETON, TRACY & CO. PREMIER; RIVERSIDE MAXIMUS, 16 size, 12 size and 0 size; RIVERSIDE, 16 size, 12 size and 0 size; No. 645; ROYAL, 16 size and 12 size; all Colonial Series watches.

(6) A breach of any of said conditions shall revert in the company the title to all movements of the grades named and all Colonial Series watches in the possession of the violator and of any one who shall have induced or knowingly participated in such breach; and upon tendering the price paid by the holder of such movements or watches the company may retake possession of the same.

(7) Jobbers must immediately send to the company's selling agents a duplicate of every bill of the above named movements and watches which they issue.

The undersigned will enforce these conditions.

WALTHAM WATCH COMPANY,
Waltham, Mass.

This conditional sale contract with right to retake goods is noticeably different from the conditional patent licenses commonly used for controlling conditions of resale by the Victor talking machine, Edison phonograph and Klaxon companies. Judge Ray held that the case was analogous to the "Bath Tub"

case recently decided by the Supreme Court rather than like the Dick vs. Henry (Mimeograph case) recently decided by the same court. These cases, decided in October and November 1912, were urged before Judges Lacombe, Cox and Ward on an appeal in this circuit decided as recently as January 13, 1913. As I pointed out when acting as attorney for the complainants, this latter case was a straight infringement suit under the Lovell-McConnell Manufacturing Co.'s Klaxon patent licenses, which provide that breach of a condition is infringement of the patents. The defendant, International Automobile League of Buffalo, had bought Klaxons under conditional licenses and sold them to members of the league at cut price, and being enjoined by the court from infringement of the patents by cutting prices, they advertised that being compelled to sell at full price they would hereafter give their profits to a charity to be named by the purchaser. Judge Lacombe, for the Court of Appeals, held that even this evasion of the Klaxon patent license was an evasion of the injunction against infringement, and ordered that the injunction be enlarged so as to specifically prohibit the league's charity scheme. Now, barely a month afterwards, Judge Ray seems to say that all attempts to fix resale prices under whatever guise are illegal under the Sherman act. This apparent conflict between Judge Ray's opinion and the Court of Appeals' decision in this circuit presents considerable difficulties to lawyers attempting to reconcile the two.

Another feature of the decision is that while Judge Ray devotes some twenty-two pages to discussion of this branch of the law, he gives only a paragraph, without mentioning even by name, various important cases, such as Circuit Court of Appeals decisions in Victor Talking Machine Co. vs. Fair, 123 Fed. 424; National Phonograph Co. vs. Schlegel, 128 Fed. 733; The Fair vs. Dover Manufacturing Co., 166 Fed. 117; also District Court decisions in Edison Phonograph Co. vs. Kaufman, 105 Fed. 960; Edison Phonograph Co. vs. Pike, 116 Fed. 863, and others.

When asked my opinion, I responded that relying on the decision of the Court of Appeals and his memory of the discussion of the hearing before Judges Lacombe, Cox and Noyes on his appeal in the International Automobile League suit, he would feel no diffidence whatever about bringing a patent infringement suit and a motion for preliminary injunction against any dealer violating Klaxon patent licenses in this jurisdiction.

The decision in this Waltham watch case, of course, does not apply outside of the Southern District of New York, and does not control other jurisdictions in which the Circuit Courts of Appeal have most emphatically sustained price fixing by patent license conditions.

Klaxon Suits Progress Slowly

In the suit against Manhattan Electrical Supply Co. there is a preliminary injunction now in force which, it is understood, is satisfactory to both parties, so that up to the present time this suit has not been pushed.

The three suits against the American Ever Ready Co. have not been pushed because the Ever Ready horn has already been enjoined by preliminary injunction of the District Court affirmed by the Court of Appeals.

The seven suits against New York dealers, New York Auto Supply Co., Zeisler, Crane & Wagner Auto Supply Co., Thirty-Five Per Cent. Auto Supply Co., National Auto Supply Co., American Auto Supply Co. and Charles E. Miller, are against sellers of the Newtown horn, and the Lovell-McConnell Manufacturing Co. having no desire to unnecessarily burden dealers are permitting these suits to await decision of the Brooklyn suit against the Automobile Supply Manufacturing Co., in which final hearing is expected in the latter part of March.

The three suits against automobile companies, Garland, Jackson and Haynes, who have offered the Sparton horn of the Sparks-Withington Co., have not yet reached the taking of testimony even under the new rules, the defendants' answers not being due until some time in March.

New Law for Texas

Favorable Report Made on Bill Providing for the Registration of Cars

Fees Based on Horsepower

AUSTIN, TEX., March 1—The judiciary committee of the Senate has reported favorably on a bill for the registration of motor vehicles and regulating their use. According to the bill, license numbers will be issued by the secretary of state without cost, the registration fee being graduated as follows: 20 horsepower and under, \$8; over 20 horsepower at the rate of 40 cents per horsepower. If a motor vehicle shall have been licensed for 5 separate years the annual registration fee thereafter shall be one-half of this amount. Motor bicycles will be registered at \$3 each. The bill provides for number plates of a different color in successive years. Persons, firms, associations or companies manufacturing or dealing in motor vehicles may instead of registering each vehicle manufactured or handled by them make a verified application for a distinctive number for use on all the vehicles owned or controlled by them. The new bill contains the usual provision for brakes and lights. The front lights shall be visible 500 feet in advance and the rear lamps must illumine the number plate making it visible 50 feet. The law as framed calls for careful and prudent driving at a rate of speed not to endanger the property of another or the life of any person, and fixes the legal limit in the country at 25 miles an hour. It permits the exclusion of commercial vehicles from parks, and also invests local authorities with the right to regulate the speed within their domains, which speeds shall not be less than 10 miles an hour in any case. Chauffeurs must take out licenses.

Illinois Towns May Have More Power

SPRINGFIELD, ILL., March 5—If House Bill No. 77, which is now before a committee of the Legislature, becomes a law, every city, village or incorporate town in the state will be given the power to regulate the size of tires used on commercial vehicles and also the annual license fee. In a word, the bill gives permission "To direct, license and control all wagons and other vehicles conveying loads within the city or village, or any particular class of such wagons and other vehicles, and prescribe the width of the tire of same, the license fee, which when collected is to be kept as a separate fund and used only for the cost and expense of street or alley improvement or repair. Provision is made for a fine not in excess of \$200 and imprisonment not in excess of 6 months for one offense."

Idaho Legislature Busy

BOISE, IDAHO, March 3—The solons of Idaho are just now wrestling with two bills providing for the regulation of the use of motor vehicles. The first bill, known as the Booth bill, was introduced early in the month of February. It was held up in committee when a second, known as the Koelsch bill, was announced.

The bill introduced by Booth provides for a registration fee of \$1. This looks simple and easy, but there is a proviso, to wit: That when any bonds are issued and sold by the county commissioners for the purpose of building roads in the county, then the license fee shall be \$1 for each horsepower of any motor vehicle. The money collected in this way is to go into a "bond interest fund" to be used to pay the interest on the road bonds. The other details of the bill are patterned after the uniform law.

The Koelsch bill is more comprehensive and covers three distinct features. It provides for a state highway commission of three members; use of convict labor on the highways, and the registration of motor vehicles. In this bill the user of a motor vehicle is taxed a graduated scale. Under 30 horsepower, \$15; 31 to 40 horsepower, inclusive, \$20; 41 to 50 horsepower, inclusive, \$25; over 50 horsepower, \$40. Dealers are taxed \$35 and \$1 for each additional plate issued. The money is to go into the road fund and the car owner is exempt from any personal property tax on his car. The state highway commissioners are given power to expend this money on the roads anywhere in the state. It is estimated that at the present time this bill would afford a fund of about \$75,000. There are about 4,000 motor vehicles in Idaho at this time.

Pennsylvania to Tax Trucks Heavily

HARRISBURG, PA., March 3—A bill to take the place of the present automobile laws of Pennsylvania was introduced into the Senate at the session of the legislature last week. The bill has the support of the Motor Federation of Pennsylvania. It changes or affects the present law as follows:

Dealer's registration fee is raised from \$5 to \$10. Fee for solid tire vehicles (motor trucks) regulated by combined weight of vehicle and load as follows: Less than 4,000 pounds, \$10; from 4,000 to 5,000 pounds, \$15; from 5,000 to 10,000 pounds, \$20; from 10,000 to 15,000 pounds, \$25; from 15,000 to 20,000 pounds, \$30.

No vehicles, including load, shall exceed 86 inches in width nor shall weight with load be more than 10 tons.

Ohio Drivers Always Liable

COLUMBUS, O., March 3—Automobile owners and drivers in Ohio are up in arms over a bill pending in the Ohio General Assembly which seeks to do away with the contributory negligence feature of the personal liability law of the state. The bill provides that any one injured in any way can collect damage for such injury, even if he is negligent. While the law does not apply to the driving of automobiles any more than any other line of endeavor, still, it is looked upon with some considerable askance by automobile drivers. An effort will be made to defeat the proposed law.

Minnesota to Get New Law

MINNEAPOLIS, MINN., March 3—Modifications of the present Minnesota automobile and road law, passed 2 years ago, have been approved by the Minnesota State Automobile Association, and a bill has been introduced in the legislature to make the changes. The bill was discussed at the annual meeting of the directors of the association during show week. In effect the changes are as follows:

Creation of a state automobile commission of three members appointed by the governor to take charge of the licensing of motor vehicles and the examination of chauffeurs, now vested in the secretary of state and the state board of examination; diversion of all receipts from licenses and fines for violation of the law into state road and bridge fund; registration fee of \$3 for 3 years for automobiles, instead of \$1.50; \$10 registration for manufacturers and dealers and \$1 for each additional car, except where in private use or for hire; misdemeanor for owner selling car to fail to report sale to the commission; charge of \$1 for remainder of year when person selling a car applies to retain the number for another car; trial judge may recommend revocation or suspension of license of driver on conviction for violation of law; licensed physician arrested for speed in answering emergency call must be allowed to proceed on giving car number and showing driver's license; creating salary of \$1,800 a year for secretary and allowing \$5 a day and traveling expenses for examiners of chauffeurs, who may be appointed in localities to represent the commission, making it a misdemeanor for anyone to drive a car while intoxicated; making it unlawful to leave car standing with engine running and to cut out the muffler. The clause exempting non-residents and the paragraph prohibiting local speed ordinances are allowed to stand. The clause requiring all occupants of a car in an accident to return and give names and addresses changed to exempt other occupants than the driver and owner.

Steering Gear Design Is Conservative

Trend Favors the Worm-and-Gear Types, Although Screw-and-Nut Constructions Are Numerous

STEERING gears, like other stable automobile parts, this year continue practically the same in design and general construction as heretofore, although here and there refinements of details such as the placing of grease cups in more accessible locations and the further facilitating of adjustment features have received attention.

The worm and full gear types are in the lead in point of numbers, the easy adjustment which the full wheel makes possible being the principle advantage claimed for this type. In accord with the general aim to make all parts of the modern automobile as silent in operation as possible, steering gear makers have brought out types in which the spark and throttle levers are held in position on the quadrant by friction instead of ratchet devices. Though a small noise factor in itself, nevertheless the slight click which the ratchet makes is deemed objectionable, and the manufacturers are therefore prepared to eliminate it, in most cases supplying optionally either friction or ratchet controlled levers.

Gemmer

The Gemmer Manufacturing Company, Detroit, produces at present four models of pleasure car steering gears and three types for commercials. The model K is seen in Fig. 1. This is a typical Gemmer type and illustrates the full worm and gear construction embodied in all of the steering mechanisms of this make. The worm is carried on annular ball thrust bearings, one above it and one below. The worm wheel is mounted on a squared shaft, permitting of the shifting of the wheel a quarter turn, thus bringing a new set of teeth into play when another set has become worn. To facilitate the lubrication of the wearing parts, grease cups and grease openings have been made very accessible. Above the worm, for instance, an opening has been provided in the housing and fitted with a spring cover, making it very easy to lubricate the gearing. To prevent rattle a spring bushing has been placed around the shaft just below the point where the spider joins the tube. This serves to steady the shaft within its housing. For light cars a new model in the Gemmer line is the type S which also has the worm and full wheel construction.

The housings of all the Gemmer types are of malleable iron with a minimum wall thickness of .1875 inch, while shafts are one-piece steel forgings. Ball arms are also forged and from high carbon steel. Jacket tubes are made of seamless brass tubing ranging from 1.5 to 2 inches in diameter and finished in brass, nickel or black enamel. The main column tubes are seamless steel of various dimensions to meet the requirements of the different sized gears. The control tubes are also of seamless steel, bronze bushed at the ends to prevent rattle and provided with a series of grooves, properly placed and reamed to avoid whipping due to vibration. The Gemmer concern furnishes four forms of controls, viz., spring lever, ratchet and two styles of friction controls, all of which are standard and interchangeable. A dozen types of spiders are also included in the line.

Warner-Toledo

Steering gears produced by the Warner Manufacturing Company, Toledo, are in six types for various sizes of cars, the heavier ones being adaptable to trucks up to 2 tons. The War-

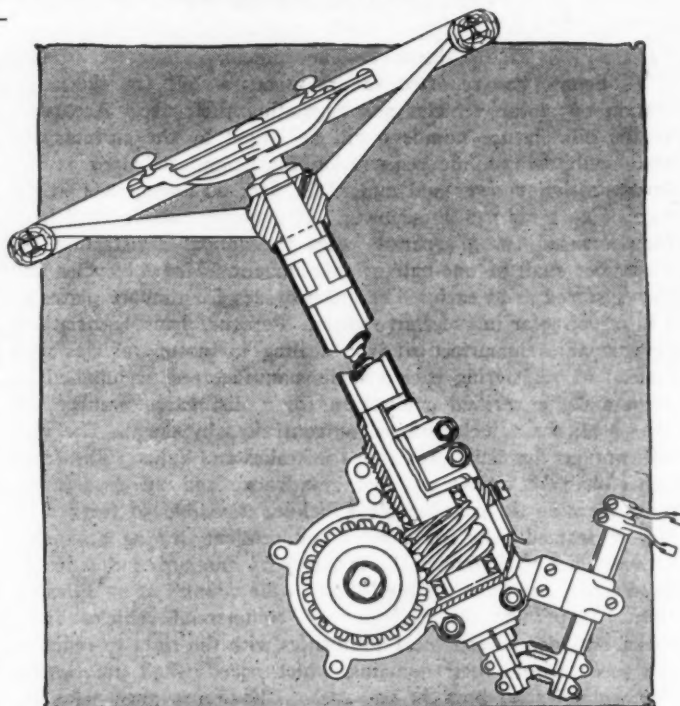


Fig. 1—Gemmer model K of the worm-and-gear type

ner design embodies the worm and full gear construction, the latter being mounted below the worm in the usual way. Type 5-A for cars of about 40 horsepower is shown in Fig. 3. It is for right-hand steer and the slope of the column is adjustable to any desired angle. Ball thrust bearings are fitted above and below the worm. Both worm wheel and worm are constructed of forged steel, hardened and ground and the mounting of the former makes it possible to change the meshing teeth for adjustment purposes. The Warner gear is, in fact, thoroughly adjustable in every way. The ball arm is conventional and is mounted on the end of the worm wheel shaft which is squared to receive it. A bolt tightens the split end of the arm around the shaft. The arm is furnished in 6, 7.5 or 9-inch length to meet the requirements. Spark and throttle rod gears are furnished either as bevels or spurs and arranged for accelerator. The column diameters range from 1.38 inch to 2 inches in diameter, while the steering wheels which are corrugated around the inner edge come either 16 or 18 inches in diameter. The spark and throttle levers may be had either with ratchet or friction control. The finish of the column and spider is also optional in that it may be either nickel, brass or black enamel. Grease cups are accessibly located.

In the Warner construction the worm gear is integral with its shaft which is eccentrically mounted in a sleeve so that wear may be easily taken up. The housing for the gearing is of malleable iron and at its top there is an adjusting nut which takes up any lost motion.

Muncie

Also of the worm and full gear type are the steering gears marketed by the Muncie Gear Works, Muncie, Ind., one style of which—model S-34 for right-hand steering—is depicted in Fig.

2. The concern makes six styles of its steering mechanisms, three for left and three for right drive and all constructed along the same lines, the features in general not differing materially from the dictates of present practice. The worm has a triple thread while the gear is provided with 20 teeth, .5-inch pitch. A ball thrust bearing is mounted above the worm and another below it. The worm wheel shaft is integral with the wheel and carries the ball arm at its squared end. The gear housing is of malleable iron and at its top there is an adjusting nut which provides for the taking up of end play.

Grease cups are accessibly located on the upper side of the housing and at the top. The spark and throttle rod gears located below the housing are beveled, while friction control of the levers on the quadrant is favored. The Muncie types in-

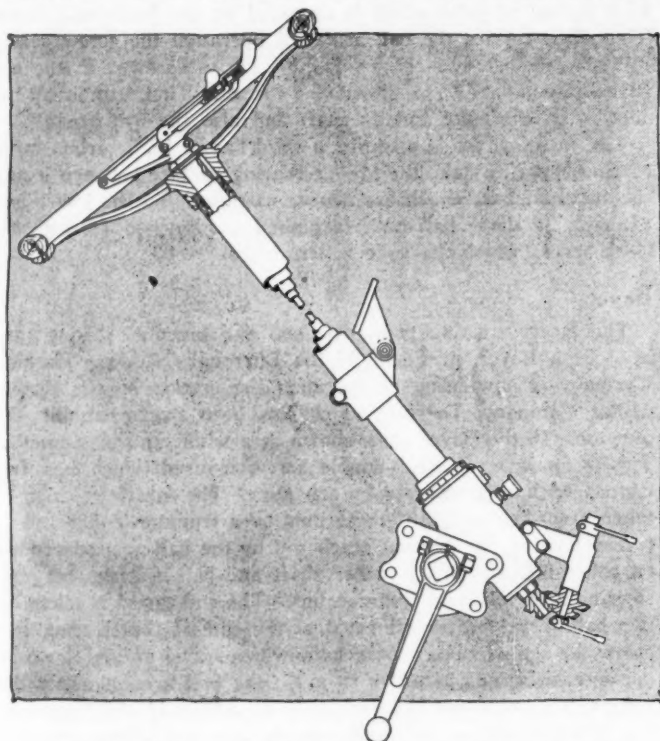


Fig. 2—Model S 34 Muncie gear for right-hand drive

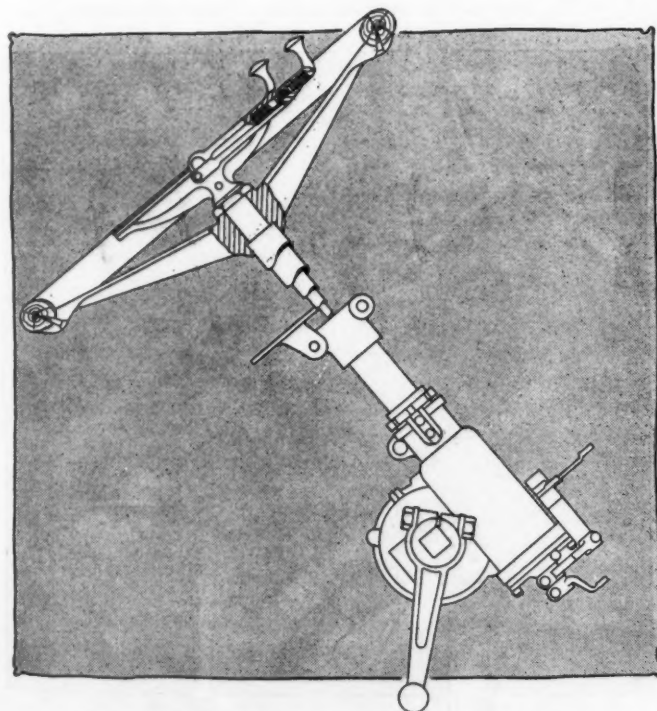


Fig. 3—Warner Mfg. Co.'s style 5-A for 40-hp cars

clude styles for use with cars having fixed spark, model S23A being provided with throttle lever only. The spark lever may be supplied with this type, however, at a slight extra cost. Steering wheels are of plain mahogany and range from 16 inches to 18 inches in diameter.

Warner-Muncie

The Warner Gear Company, Muncie, Ind., makes a very complete line of steering gears for pleasure cars, taxicabs and commercial vehicles. These are all of the worm and full gear type with adjustable angle column. One type is shown in Fig. 4, which is typical of the styles made for pleasure cars. A sectional view showing the details of the worm and gear construction and mounting is also given. A ball thrust bearing is mounted above and below the worm, while take up for end play is provided in the usual way, by means of a nut at the top of the housing. Grease cups on housing take care of the lubrication of the contact parts. The type shown in the figure is model 12E and is designed for cars of from 35 to 45 horsepower. The shaft carrying the worm wheel is integral with the latter in this type, but the Warner concern also makes types in which wheel and shaft are separate. In this case the gear fits to a squared shaft end.

Several types of hand wheels are furnished with the Warner gears. The rim of the spider may be made continuous with the spokes and rabbitted into the wood, the top and bottom laminations being glued together thus concealing the metal. Or the ends of the spokes may be fitted into grooves in the wood rim or screwed to it. These gears may also be had with throttle lever only for fixed spark cars. All types are furnished in either black enamel, nickel or brass finish as desired. The commercial car styles retain the design characteristics of the pleasure car types, but they are, of course, made heavier for the heavier duty service.

Ross

The Ross Gear and Tool Company, Lafayette, Ind., manufactures steering gears for commercial cars only. These are made in five styles for vehicles ranging from 5 tons to 500 pounds capacity. The type shown in Fig. 5 is the heaviest of the line and is model BF for 3 to 5-ton propositions. All of the Ross steering gears have the same features of construction. The steering wheel hub is tapered and keyed to the steering

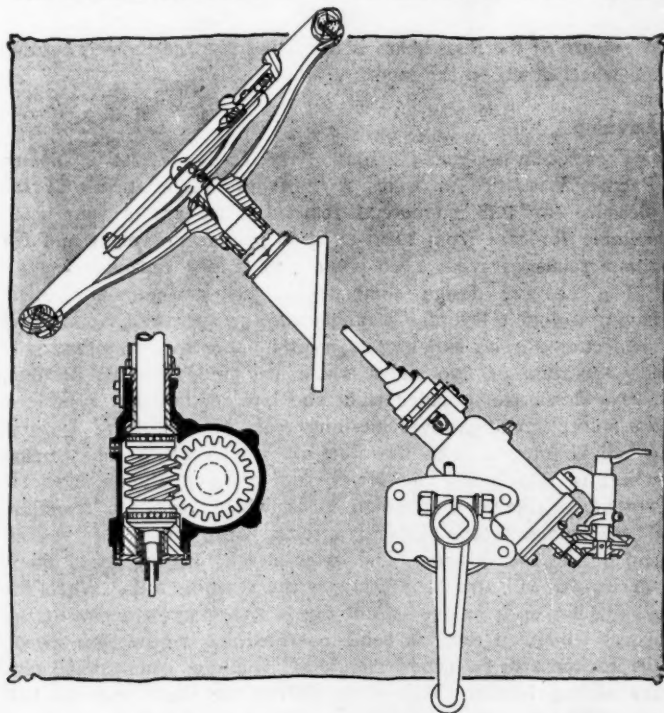


Fig. 4—General construction of a Warner Gear Co. type

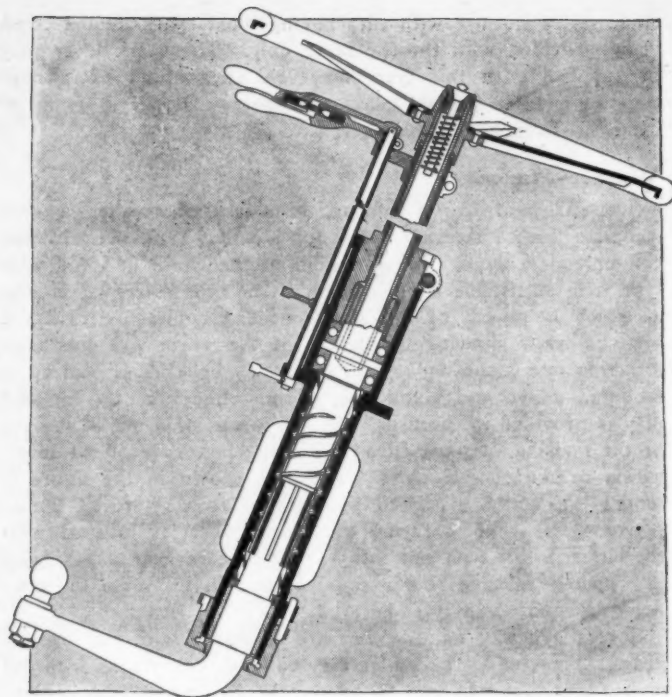


Fig. 5—Ross type BF steering gear for heavy trucks

tube, the lower end of which is integral with a steel screw. This screw operates a sleeve of phosphor bronze which surrounds it and which is threaded to receive the screw. The outer surface of this sleeve is provided with spirals, the pitch of which is very long as compared with that of the screw threads. A malleable housing surrounds the sleeve, in turn, and its inner surface is spirally grooved to receive the spiral projections of the sleeve. Thus when the steering wheel is turned, it turns the screw and gives up and down motion to the sleeve, and in order to so move, it must turn, due to the spirals on its exterior mating with the spiral grooves in the housing. This rotary motion is transferred to the ball arm which extends half way up into the housing. The upper end of this arm is splined, the splines fitting into slots in the inner surface of the sleeve, thus allowing the sleeve to move up and down and at the same time turn the extended end of the ball arm. A feature of the Ross gears is the oiling plug on the nut holding the wheel down on the taper.

Lavigne

These steering gears, made by the Lavigne Gear Company, Racine, Wis., are in styles to meet the requirements of the pleasure car and commercial vehicle. They are in four sizes, suitable for cars from 1,800 to 4,500 pounds in weight and for commercials of from 1,000 pounds to 6 tons capacity.

The Lavigne design comprises a push-and-pull mechanism having a double leverage arrangement for operating the steering connections. The ball arm is moved backward or forward by the operation of two slides which are guided by the housing. These slides are threaded right and left on their inner surface, the spiral thread grooves meshing with the threads of a worm which is integral with the steering rod to which the steering wheel is attached. The lower end of each sliding block is slotted to receive a trunnion block which carries a trunnion. These trunnions are parts of a rocker arm, one being on each end of the rocker arm. The latter attaches to the shaft which carries the ball arm connecting to the steering rods. When the sliding blocks are moved up or down by the screw action of the worm which, in turn, is being operated by the steering wheel, the rocker arm is turned due to its trunnion connections with the sliding blocks. This rocker turns the shaft and the ball arm. The construction eliminates the use of ball thrust bearings, since the thrust is taken by the trunnions. The wear of

the sliding blocks or head against the housing is taken up automatically by two shoes which are pressed out against the sliding contact surface by springs.

Jacox

This is the trade name of the steering mechanisms made by the Jackson, Church, Wilcox Company, Saginaw, Mich., which products are designed for both pleasure cars and trucks. The principle involved is that of a double threaded screw and two half-nuts. The screw is attached to the steering rod which runs up through the column and is turned by the steering wheel. The half-nuts surround the screw and slide up and down within the gear housing when the screw is operated. The lower ends of these half-nuts bear on rollers at each end of a rocker or yoke which is mounted on the horizontal shaft. This shaft carries the ball arm. In operation the screw serves to back one half-nut off while the other is screwed in the opposite direction, due to the double thread. This motion of the nuts twists the yoke and its shaft and also the ball arm.

The Jacox screw is made of a solid bar of high carbon steel, casehardened to make the proper bearing surface between it and the two half-nuts which are bronze castings. To the lower end of each of these half-nuts is pinned a hardened steel thrust block across which the yoke rollers travel.

Boyer

The Boyer steering gear, designed and invented during 1910 by Joseph Boyer, president of the Burroughs Adding Machine Company is now being placed upon the market by the Boyer-Miller Company, Detroit, which has been organized for the purpose. In the Boyer gear, shown as a whole and in section in Fig. 6, an integral steel double screw is used which has full contact with two separate bronze nuts. The steering action is taken from the center of these nuts by a trunnion collar and is transferred to the steering reach rod by the ball arm suspended on roller bearings at its rocker shaft and ball bearings between steering arm yoke and trunnion fins. The end thrust is taken by two ball thrust bearings located at the end of the steering rod below the screw. The bronze nuts, which travel up and down in opposite directions in order to move the ball arm in either direction, are solid, yet they are entirely adjustable by loosening the trunnion collar bolt and turning one nut. This steering gear is being made in several sizes to meet all requirements of frame construction, weight, size and kind of steering wheel.

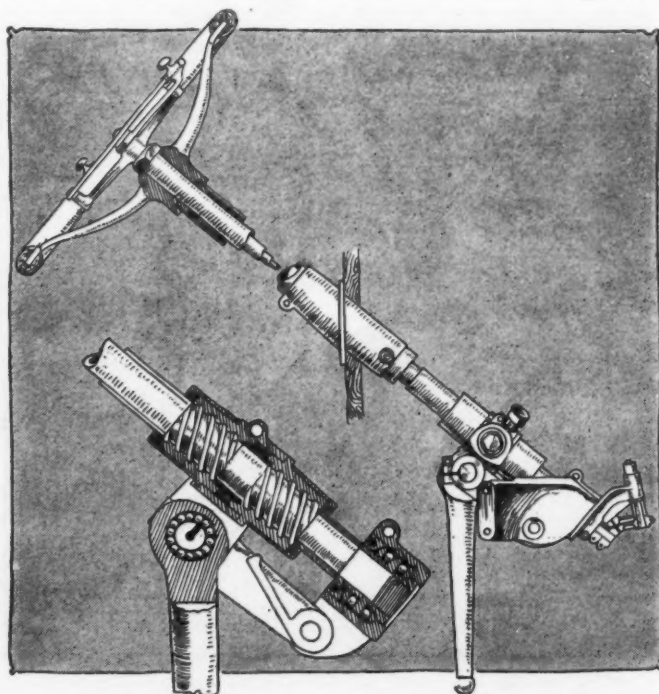


Fig. 6—New Boyer gear of the screw-and-nut design



Side view of the Maxim tricar equipped with light delivery body

A Three-Wheeled Vehicle

Maxim Tricar Adapted for Both Business and Pleasure—Two-Cylinder Motor

THERE has been more or less activity among automobile engineers during the past few years in the way of three-wheeled vehicles designed for both pleasure and commercial use. The tricar has always been an alluring proposition and the makers of these vehicles point out that the foremost of the world's designers and builders of motor cars have begun with a three-wheeled vehicle, and only cast aside three-wheel construction because of its limitations in the matter of speed.

An acquisition to the three-wheeled fold is the Maxim Tricar built by the Maxim Tricar Manufacturing Corporation, of New York City. This vehicle, which is designed for both business and pleasure is the joint construction of Maxim Karminski, an automobile engineer who has had much experience on the continent, in France, Germany, Italy as well as in England, and Charles Peters. The type of car is well known in Europe, but not as much so in America.

The Maxim machine is equipped with a unit power plant, so that the substitution of a new equipment is the work of but a moment.

The motor is of the double-cylinder vertical type, and develops about 8 horsepower. The unit type power plant is suspended above the front wheel and the drive is through a single roller chain to a larger sprocket secured on the front wheel. The construction is a simple affair, practically the entire machine being built over the front wheel. That is to say, the motor and transmission are thus placed.

It has been the practice of some followers of the three-wheeled design to place their single driving wheel in the rear, but the Maxim makers place theirs in front, a reversal of the common practice.

The motor cylinders are cast singly, side by side, and are secured to an aluminum crankcase which is cast in two vertical sections having integral with its side-plates which form the bed or support. The motor is secured to a bedplate above, and cast as a solid piece with the mudguard. This acts as the support for the motor, steering device and the shock-absorber at the same time. The cylinders have integral ribs. Automatic inlet valves of large diameter are used, though the exhaust valves are mechanically operated. The bore of the cylinders is 3.25 inches and the stroke is 4.5 inches. The pistons, like the cylinders, are cast of gray iron and have three compression rings placed above the wristpin, while there is a fourth holding the pin. The crankshaft, which is 1.5 inches in diameter, is a built-up member. The transmission is a simple two-speed planetary affair, controlled from the operator's seat, and as but a slight movement of the wrist is necessary to engage either speed, to stop the car is a very easy matter. This transmission is carried on the left side of the motor case, being controlled from the steering rod or

guide from which is a horizontal steel tube 1.5 inches in diameter. The operator holds a grip which describes a horizontal plane. The drive of this transmission to the front wheel is through a roller chain.

To eliminate road shocks, this chain is fitted with a small sprocket idler and this is provided with a spring attachment easily adjusted so that, as the car jounces over a rough piece of road, the tendency of the chain to jounce or wobble out of position is overcome.

The axle of the front wheel is fitted onto these springs, and the worst kind of road cobblestone, etc., does not affect the smooth running of the car.

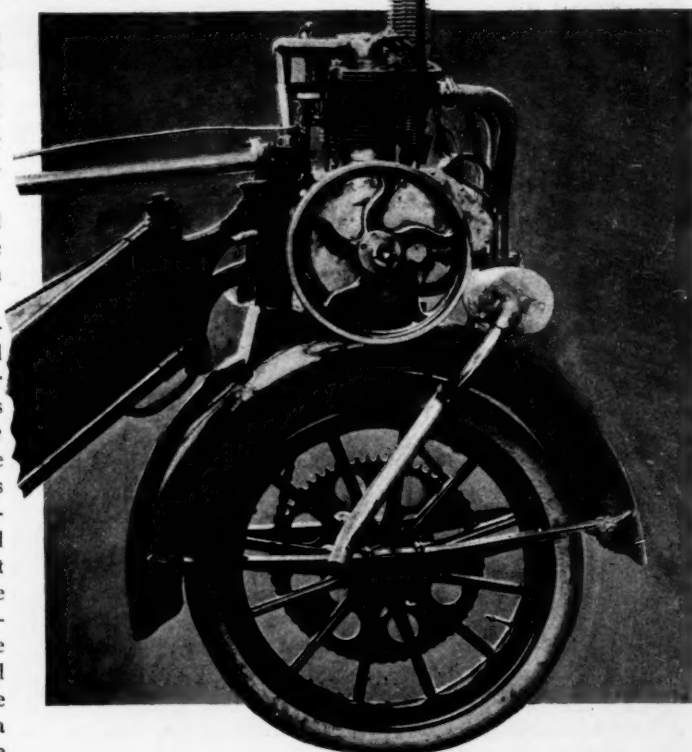
One of the most commendable features of this machine is that it is interchangeable. The motor, transmission and driving element being mounted over the front wheel, the entire propelling assembly is a unit. The withdrawal of the locking bolt connecting this unit with the chassis, is all that is required to take out the damaged unit, and replace same with another one. The frame of this Maxim is made of heavy gauge tubular steel 1.5 inches in diameter, and the construction is of the so-called bridge type. It is, however, the intention of the builders to turn out these cars with a channel steel frame same as used by other automobile manufacturers.

The springs used are semi-elliptic in form, being built of five leaves 1.5 inches wide, and 32 and 29 inches long respectively. These springs are provided with a shackle, which allows plenty of play without disalignment. The wheels are wood, artillery type clincher rims being used, the tires being 28 by 2.5 inches in size. Ball bearings are used in the front and rear members. The hubs are made of steel and the spokes are of hickory.

There are two brakes on the rear wheel drums, the drums being steel 10 inches in diameter, with a 2-inch face. These brakes are of the internal expanding type similar to those used on other cars, and are actuated through a single pedal on the right hand side of the floor board, besides a lever used for emergency cases.

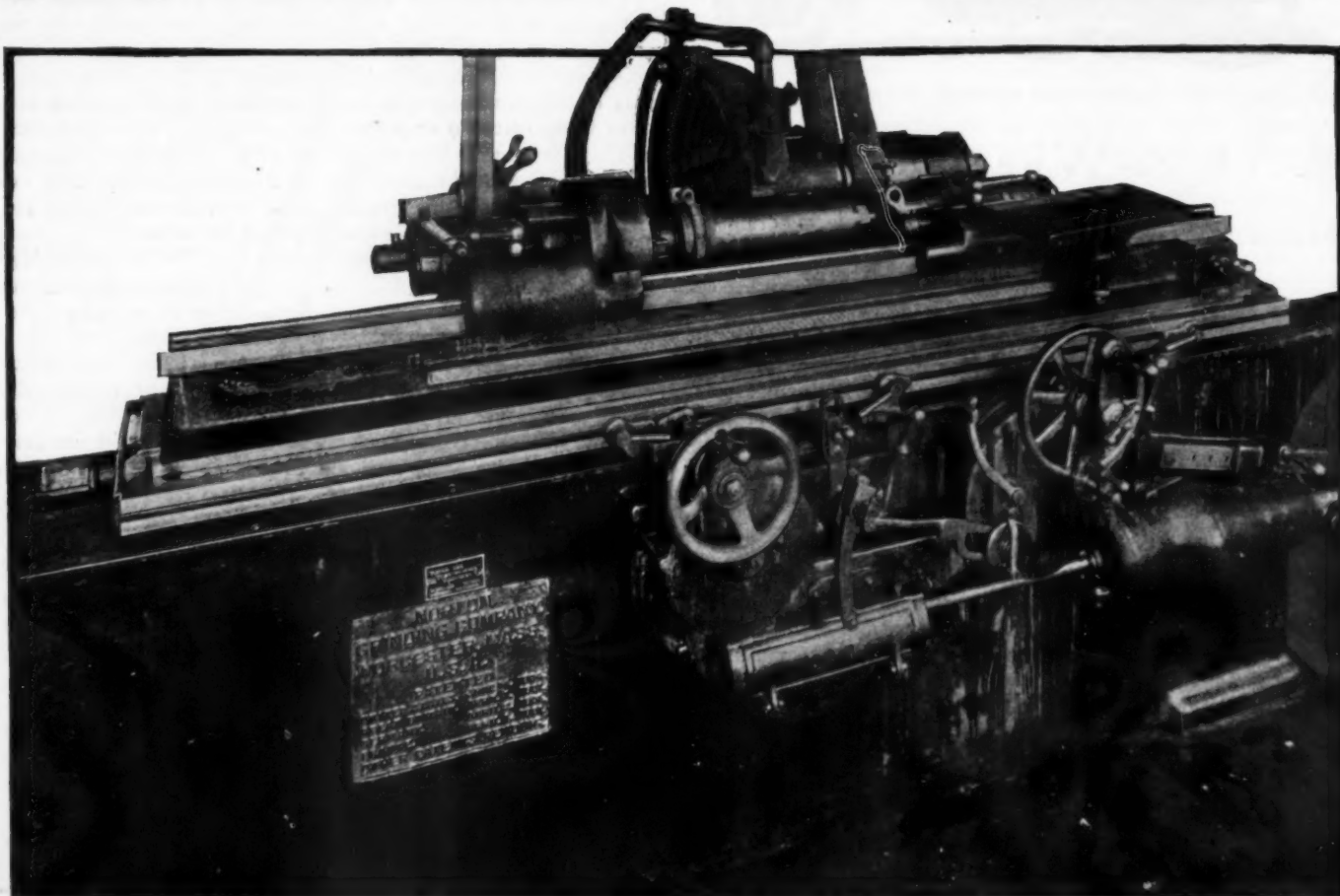
Ignition is by the Bosch high-tension system, the magneto being secured to the motor base and driven from the crankshaft.

There are two types of bodies used for delivery purposes, one of the box type with space area of 23 cubic feet and the other is on the Ford commercial body type, covering the driver's seat. The capacity is about 600 pounds.



Power plant of the Maxim machine, showing motor mounting

Factory Miscellany



One of the twenty grinding machines used in the factory of the F. B. Stearns Co., Cleveland, O., on the outside surface of the Knight sleeves

IN the Knight sliding sleeve motor the sleeves must be accurately ground. In the manufacture of this motor there is a great area to be ground and for that reason the grinding machines used in the factories which make these motors are of special interest. The above illustration shows one of the machines used for this purpose in the Stearns company which specializes in Knight cars. Twenty machines of this type are used in the

Knight factory and it takes three operations for each sleeve. It requires but one operator to take care of the machine. The operation is similar to other grinding jobs in most respects. The emery wheel turns toward the work while the latter turns in the opposite direction away from the wheel. Above the wheel a pipe keeps a constant supply of cool water flowing on the metal keeping the surface clean and cool.

POWER Plant Efficiency—One of the aims of automobile designers has been to increase the efficiency of the power plant, that is, to secure a maximum of power on a minimum fuel consumption and with a minimum of wear. The marked advance in the price of gasoline in the last year has made this efficiency a more important factor than ever. One of the steps is the use of the long-stroke motors.

Chatham Planning Factory—The Chatham Auto-Wheel Company, Chatham, Ont., is planning the erection of an auto-wheel plant, the estimated cost of which is \$40,000.

Wilcox-McKim Builds—The Wilcox-McKim Company, Saginaw, Mich., has been organized to manufacture automobile accessories. Plans for a factory have been completed.

Hudson's Second Addition—The Hudson Motor Car Company, Detroit, Mich., will start work at once on a second addition to its plant, which will result in the doubling of its facilities.

Working Day and Night—The Warner Manufacturing Company, maker of automobile parts, is employing 750 men and the factory is working day and night in an endeavor to keep abreast of orders.

Rubber Company in Maissonneuve—The Plymouth Rub-

ber Company hopes to locate a factory in Maissonneuve, Ont. It has written to the council asking for the best terms, and it looks as if the negotiations would end successfully.

Hendrie Tire's New Factory—The W. C. Hendrie Rubber Company, Denver, Col., has just purchased 6 acres of land in Torrence, Cal., and has closed contracts for a \$100,000 automobile tire factory, to be erected on the site this year.

Establishes Rolling Mill—The Standard Aluminum Company, Two Rivers, Wis., is planning to establish a large rolling mill in connection with its present foundries and stamping works. A large combination stamping and drawing press has recently been installed.

National Gauge Builds Plant—To accommodate the rapid expansion of business of the National Gauge and Register Company, La Cross, Wis., a new factory is to be erected. Eighty-five men are employed. The new plant will have 20,000 square feet of floor space.

Alliance Purchases Land—The Alliance Motor Car Company, Alliance, O., has purchased land in that city upon which it will erect a two-story brick block factory, 52 feet by 160 feet. This plant will cost between \$16,000 and \$20,000 and will be begun prior to April 1 and completed within 60 days thereafter.

Mather Spring Increases Capacity—The Mather Spring Company, Toledo, O., will double its plant capacity.

Plant in Cuyahoga Falls—A concern is being organized at Cuyahoga Falls, O., to erect a factory for the manufacture of automobile lamp reflectors. W. A. Wyatt is one of the promoters of the concern.

Beloit Works Enlarged—The Stewart-Warner Speedometer Corporation, of Chicago, Ill., is planning to enlarge its works in Beloit, Wis., in the addition of a couple of wings, to be added in the early part of spring.

Plant Turned Over to Trustees—R. H. Cook, doing business as the Cook Body Company, Flint, Mich., has turned the affairs of the company over to C. O. Hetchler, as trustee. Mr. Hetchler will effect a settlement with the creditors.

Go By Name of Fuller—On account of the recent change in name of the Michigan Automobile Co., Ltd., to Fuller & Sons Mfg. Co., it has been decided by the company to hereafter call all the products of the new company by the name of Fuller.

Truck Plant for Salt Lake—If plans are carried out there is every promise that Salt Lake City, Utah, will have in the near future an automobile truck factory that will mean an investment of \$1,000,000 or more. It is said that the plant would eventually employ 3,000 workmen.

Starter Company Formed—The Krank-Less Starter & Manufacturing Company, Cleveland, O., advises that it has been organized to manufacture the Krank-Less starter, speeder and gasoline saver. No factory will be built at present, but the company contemplates building later in the year.

Clark Manufacturing Brass Gauge—The Clark Motor Car Company, Louisville, Ky., has begun the manufacture of a patented brass gauge for use in handling liquids, especially oil and gasoline. The company plans the enlargement of its facilities to take care of the new business if it develops favorably.

Body Company Builds—Automobile bodies are to be manufactured by the Capitol Body Company, which has just been organized in Indianapolis, Ind., and incorporated with an authorized capitalization of \$10,000. A factory is to be established immediately and about 2,500 bodies will be manufactured annually.

Atlas Forge Company's Plant—According to Manager S. H. Carpenter, of the Atlas Drop Forge Company, Lansing, Mich., the company will double its capacity this spring by the erection of a fireproof steel plant twice the size of the one being used. While the plans have not been completed, it is said the new building will be modern in every respect.

Quick Work In Rebuilding—On February 8 the Double Fabric Tire Company, Auburn, Ind., suffered the loss of its factory by fire. By February 15 the vulcanizing kettles and metal cores were dug out, cutting tables were made, large quantities of material and equipment were wired for, and by the 17th practically a full force was working in the new factory.

Painesville Starts Automobile Factory—The Vulcan Manufacturing Company, a new Painesville, O., concern, is to enter the automobile manufacturing business. A plant which had been idle has been purchased and is to be remodeled for best use of the company. One hundred and fifty men are expected to be employed there before July 1 and 1,000 automobiles are to be turned out during the present year.

State Electric Will Build—A company, to be known as the State Electric, Ltd., has been formed with Montreal, Que., and Toronto, Ont., capital to manufacture electric commercial vehicles at Walkerville, Ont., and plans are being prepared for a factory to cover more than 40,000 square feet. The directors of the new company are H. Timmins, N. A. Timmins, W. S. Hutchinson, C. E. Archibold and S. Carsley.

Plant at Xenia—An organization for the purpose of increasing the capital stock of the Baldner Automobile Manufacturing Company, Xenia, O., from \$5,000 to \$150,000 has just been effected. The selling stock of the company will be increased to \$48,000. It is the purpose to establish an automobile manufacturing plant at Xenia to manufacture a car of the roadster type after a model made by Jacob Baldner. A commercial car will be built.

Swinehart Expanding—Contracts have been let by the Swinehart Tire & Rubber Company, Akron, O., for the construction of new buildings. One addition, 100 feet by 70 feet, and three stories high, will be added to its main plant. Other buildings, including a laboratory, 30 feet by 60 feet, have been erected. In the main building will be installed new rubber machinery capable of tripling the company's present output. A new 1,200-horsepower Corliss engine, with additional boilers, is now being installed.



Shows, Conventions, Etc.

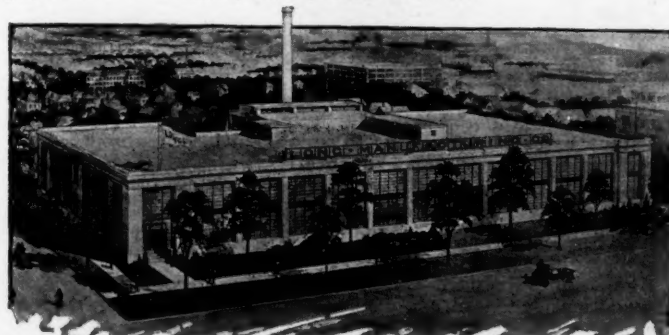
- March.....Indianapolis, Ind., Spring Automobile Show, State Fair Grounds, Indianapolis Automobile Trade Association.
 March.....Nashville, Tenn., Annual Show, Nashville Automobile Dealers' Association.
 March 1-8.....Pittsburgh, Pa., Annual Automobile Show.
 March 3-8.....Bridgeport, Conn., Show, Park City Rink, B. B. Steiber.
 March 3-8.....Denver, Col., Annual Show, Municipal Auditorium.
 March 3-8.....Springfield, Mass., Automobile Show, New Auditorium Building, United Amusement Company.
 March 3-18.....Des Moines, Ia., Annual Show, Pleasure Car Section, Coliseum, Dealers' Association.
 March 5-8.....Tiffin, O., Annual Show, Tiffin Daily Advertiser.
 March 5-8.....Louisville, Ky., Annual Show, Dealers' Association.
 March 5-8.....London, Ont., Annual Show, Drill Hall, Louis Blumenstein.
 March 8-15.....Boston, Mass., Annual Automobile Show.
 March 8-15.....Columbus, O., Annual Show, Billy Sunday Tabernacle, Automobile Club and Traders' Association.
 March 10-15.....Columbus, O., Opening Week, Columbus Automobile Trades Association.
 March 11-15.....Buffalo, N. Y., Commercial Vehicle Show, Auditorium, Automobile Dealers' Association.
 March 12-15.....Ogdensburg, N. Y., Automobile Show, Louis Blumenstein, Manager.
 March 17-22.....Norfolk, Va., Annual Show, Armory Building, Norfolk Automobile Trade Association, Inc.
 March 19-26.....Boston, Mass., Annual Truck Show.
 March 20-24.....New Orleans, La., Annual Show, N. O. A. D. A.
 March 24-29.....Indianapolis, Ind., Annual Automobile Show.
 April 1-6.....San Francisco, Cal., Motor Truck Show, Coliseum Hall, Motor Field.
 April 5-19.....Pittsburgh, Pa., Annual Show, East Liberty Market House, Dealers' Association.

Race Meets, Runs, Hill Climbs, Etc.

- May 5-8.....Washington, D. C., Motor Truck Reliability Run, Washington Post.
 May 30.....Indianapolis, Ind., 500-Mile Race, Speedway.
 July 1.....Indianapolis, Ind., Tour of Indiana Automobile Manufacturers' Association to the Pacific Coast.
 July 1-16.....Winnipeg, Man., Motor Plow Competition, Dr. A. W. Bell, Manager.
 July 8-16.....Winnipeg, Man., Midsummer exhibition, A. C. Emmett, Manager.
 July 27-28.....Tacoma, Wash., Tacoma Road Races.
 Nov. 24.....Savannah, Ga., Vanderbilt Cup Race, Motor Cups Holding Company.
 Nov. 26.....Savannah, Ga., Grand Prize Race, Automobile Club of America.

Foreign

- March.....France, Sealed Bonnet, 3000-Mile Run.
 March 31.....Montevideo, Uruguay, International Competition of Agricultural Motor Vehicles.
 April.....Barcelona, Spain, International Exhibition.
 May.....St. Petersburg, Russia, International Automobile Exposition, building of Michael Maneze, Imperial Automobile Club of Russia.
 July 12.....Amiens, France, Grand Prix Race.



Factory of the Long Mfg. Co., Detroit, Mich., where motor hoods are made

BULLETIN News of the Week Condensed



General view of the Brooklyn automobile show held in the Twenty-Third Regiment Armory last week

PRESIDENT WILSON Invited—President Woodrow Wilson is to be extended a special and cordial invitation to attend the Grand Prize and Vanderbilt Cup automobile races on the Chatham County course in November. It is possible that a special committee from the Savannah Automobile Club, Savannah, Ga., promoters of the races, will deliver the invitation to him in person in Washington, D. C.

Utica's Show Busy—The annual automobile show is being held this week in Utica, N. Y. The exhibition is being held at the Amory building.

Manager of New Branch—E. C. Cox has been appointed manager of the Findeisen & Kropf Mfg. Co.'s Eastern sales and service branch, New York City.

Elmira's Third Annual Show—The third annual automobile show held under the auspices of the Elmira Automobile Club proved successful. Twenty dealers displayed their cars.

Large Registration in Ohio—According to the announcement of state registrar of automobiles J. A. Shearer, 37,000 automobiles were registered in Ohio since January 1. This figure was reached February 23.

McCulla with Packard—W. R. McCulla has accepted a position with the Packard Motor Car Co., Detroit, Mich., as assistant research engineer. The Packard company has secured his services for experimental work.

Opens New Franklin Building—R. C. Hamlin, Franklin dealer in Los Angeles, Cal., has completed and opened up his new building. The structure is a story and a half in height with a frontage of 87 feet and is 105 feet in depth.

Age Limit Reduced—A bill has been introduced in the Connecticut legislature reducing the age limit necessary for the operator to obtain a license from 18 to 16 years. The bill is set for a hearing shortly along with other proposed measures.

Import and Export Figures—Automobiles show an inter-

esting record in our trade, the value of the import of automobiles and parts thereof having fallen from \$5,000,000 in 1906 to a little over \$2,000,000 in 1912, while the exports increased from \$1,000,000 in 1906 to \$28,000,000 in 1912.

Bennett Succeeds MacDonald—J. H. MacDonald, for 18 years executive head of the Connecticut highway department, states that he has decided to relinquish his post in favor of C. J. Bennett of Hartford, appointed recently highway commissioner, with dispute.

Civic Garage Proposed—A civic garage in which to house automobiles while owners are transacting business in the congested districts of Rochester, N. Y., is being advocated. A small fee would be charged each owner who desires to take advantage of the garage. The garage would be maintained by the city.

World's Visible Cotton Supply—Secretary Hester of Louisiana recently made a statement of the world's visible supply of cotton, showing the total visible to be 5,636,955 against 5,667,841 last week, 6,001,350 last year and 4,795,889 year before last. Of this the total of American cotton is 4,135,955 against 4,222,841 last week and 4,841,350 last year.

New Britain Wants Apparatus—New Britain, Conn., is anxious to improve fire and police service by the installation of motor equipment. In the budget for the new year the police department asks for a motor patrol and ambulance at a cost of \$5,000. The fire department wants two motor fire trucks to cost \$12,000 and a car for the chief to cost \$1,500.

Wisconsin Association's Second Convention—The Wisconsin County Highway Commissioners Association, Madison, Wis., recently held its second annual convention. It lasted 4 days and brought out a splendid discussion of ways and means, as well as achievements in permanent highway construction in that state during the time that the state-aid law has been in effect. A law was passed making the annual appropriation by the state, after 1913, \$850,000.

New Agencies Established During the Week

PLEASURE CARS

Place	Car	Agent
Aberdeen, Wash.	KisselKar	M. M. Stewart.
Barre, Vt.	KisselKar	Barre KisselKar Co.
Bartlesville, Okla.	Moon	Cherokee Motor Car Co.
Booneville, Mo.	KisselKar	Johnson & Stevens.
Boston, Mass.	Nyberg	Clyde H. Smyth.
Boston, Mass.	Palmer Singer	H. A. Clapp.
Bremerton, Wash.	KisselKar	W. J. Benbenick.
Bridgeport, Conn.	KisselKar	Boulevard Garage.
Canton, O.	Marmion	Wise-Green Motor Car Co.
Chehalis, Wash.	KisselKar	Twin City Auto Co.
Chicago, Ill.	McFarlan	Jos. B. Deibler Motor Car Co.
Chico, Cal.	KisselKar	W. W. Head.
Cle Elum, Wash.	KisselKar	B. N. House.
Columbus, O.	Detroit	Batdorf & Stampfle.
Columbus, O.	Locomobile	Engle & Vincent Co.
Columbus, O.	Patterson	Batdorf & Stampfle.
Colusa, Cal.	KisselKar	Geyer & Boroski.
Cottage Grove, Ore.	KisselKar	Newmuth Auto Co.
Craig, Iowa	Moon	Craig Auto Co.
Crow's Landing, Cal.	KisselKar	B. E. Munson.
Davenport, Iowa	KisselKar	Kneupel & Ott.
Dayton, O.	Reo	Miami Valley Auto Co.
Elko, Nevada	KisselKar	Elko Auto Co.
Forest Grove, Ore.	KisselKar	J. J. Wirtz.
Fort Worth, Texas	KisselKar	Chandler & Hightower.
Fostoria, O.	Oakland	Nestlerode Bros.
Glen Cove, L. I., N. Y.	KisselKar	Ed. J. Deasy.
Grenport, L. I., N. Y.	KisselKar	Hedge's Garage.
Hackensack, N. J.	KisselKar	Hackensack Auto Service.
Harrisburg, Ill.	Moon	Chas. V. Parker.
Hillsboro, O.	Hudson	Currie Motor Car Co.
Hillsboro, O.	R. C. H.	Currie Motor Car Co.
Joplin, Mo.	Moon	Joplin Supply Co.
Kenosha, Wis.	McFarlan	Russell Bros.
Kent, Wash.	KisselKar	McGhee Auto Co.
Kenton, O.	Lambert	Littleton & Critchfield.
Lebanon, Ore.	KisselKar	W. J. Booth.
Lexington, Ky.	KisselKar	O. R. Hukle & Co.
Lexington, Ky.	McFarlan	O. R. Crutcher.
Lima, O.	Little	Rudy & Salicrup.
Lima, O.	Mitchell	Shappell & Carson.
Lima, O.	Studebaker	E. H. Hawisher.
Lindsay, Ont.	Ford	Madison Williams & Son.
Los Angeles	McFarlan	Louis F. Benton Co.
Louisville, Ky.	Little	Reimers Motor Car Co.
Macon, Mo.	Moon	Macon Garage Co.
Madison, Wis.	McFarlan	Green Bay Motor Car Co.
Marion, O.	Stevens-Duryea	C. C. Stoltz.
Mediapolis, Iowa	Moon	Fleener's Garage.
Middletown, Conn.	McFarlan	S. M. Foote.
Mitchell, S. D.	McFarlan	Mitchell Auto & Supply Co.
Montclair, N. J.	Moon	Montclair Garage & Machine Co.
Monroe, Ore.	KisselKar	A. Wilhelm & Sons.
Monterey, Mexico	KisselKar	I. F. Austin.
Montreal, Canada	McFarlan	N. A. Racine.

Place	Car	Agent
Montreal, Que.	Nyberg	De Vaux Motor Car Co.
Moosejaw, Sask.	KisselKar	Saskatchewan Garage.
Mt. Vernon, Wash.	KisselKar	Ernest Peterson.
Mt. View, Cal.	KisselKar	W. A. Platt.
New Berg, Ore.	KisselKar	S. A. Mills.
New Orleans, La.	McFarlan	Swartz & Co.
New York City	Vulcan	Sidney B. Bowman Automobile Company.
Niles, Cal.	KisselKar	E. F. Rose.
North Yakima, Wash.	KisselKar	Yakima Auto & Supply Co.
Oakland, Ore.	KisselKar	E. E. Leas.
Old Town, Me.	McFarlan	C. B. Swan.
Owen Sound, Ont.	KisselKar	Hugo A. Gutenkunst.
Paso Robles, Cal.	KisselKar	E. T. Neal.
Paterson, N. J.	KisselKar	Taximeter Auto Co.
Phoenix, B. C.	KisselKar	Morrin-Thompson Co.
Placerville, Cal.	KisselKar	F. H. Davis.
Pleasanton, Cal.	KisselKar	J. S. Gill.
Portland, Ore.	McFarlan	Gerlinger Motor Car Co.
Reno, Nevada	KisselKar	Western Auto Supply Co.
Rochester, N. Y.	McFarlan	Carthage Motor Car Co.
Roseberg, Ore.	KisselKar	John Gray.
Rosenburg, Texas	Moon	Rosenburg Auto Co.
Salem, Ore.	KisselKar	C. L. Rose Co.
San Mateo, Cal.	KisselKar	Wisnom-Bonner Hardware Co.
Santa Cruz, Cal.	KisselKar	T. W. Thomson.
Schaller, Iowa	Moon	E. F. F. Hasseler.
St. Helena, Ore.	KisselKar	McCoy & Veazie.
St. Louis, Mo.	McFarlan	Coller-Reitz Motor Car Co.
Stockholm, Sweden	KisselKar	C. R. Miller.
Taylor, Tex.	Moon	Prewitt Auto Co.
Tiffin, O.	Detroit	Fred Fetzer.
Tiffin, O.	Mitchell	R. T. & E. E. Outhwaite.
Tiffin, O.	Overland	J. G. Miller.
Tiffin, O.	Rambler	Bellevue Garage.
Toronto, Ont.	Humber	Stepney Motor Wheel of Canada, Ltd.
Toronto, Ont.	Stutz	Maxwell Stoddard Ontario Co.
Turlock, Cal.	KisselKar	Brooks Auto Co.
Ukiah, Cal.	KisselKar	F. O. Taylor.
White Salmon, Wash.	KisselKar	G. A. Thomas.
Winters, Cal.	KisselKar	F. M. Wyatt.
Williamina, Ore.	KisselKar	C. R. Canfield.

COMMERCIAL VEHICLES

Canton, O.	Gramm	Wise-Green Motor Car Co.
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ELECTRIC VEHICLES

Canton, O.	Standard	Wise-Green Motor Car Co.
Louisville, Ky.	Baker	Yager Motor Car Co.
Louisville, Ky.	Chicago	Kentucky Auto Co.
Louisville, Ky.	Grinnell	Rommel Motor Car Co.
Louisville, Ky.	Waverley	A. E. Reid.

Wilson Midland Sales Manager—C. G. Wilson was recently appointed general sales manager of the Midland Motor Car Co., East Moline, Ill.

Murphy Resigns from Splitdorf—G. H. Murphy has severed his connections with the Splitdorf Electrical Co., New York City, as assistant treasurer.

Pittsburgh Show On—The Pittsburgh Auto Show Association is holding an automobile show this week at the Exposition Building, Pittsburgh, Pa.

Mackaye with Keeton—H. D. W. Mackaye has received the appointment of special factory representative of the Keeton Motor Co., of Detroit, Mich.

Ambler Wants Fire Apparatus—The Old York Road Fire Co., Ambler, Pa., has appointed a committee to purchase a new fire fighting automobile, at a cost of \$10,000.

Livingston Goodrich-Diamond Manager—G. E. Livingston has been appointed manager of the Columbus, O., branch of the Goodrich-Diamond Co. to succeed C. W. Walker.

Republic's Indianapolis Factory Branch—The Republic Rubber Co., Youngstown, O., has established a factory sales branch in Indianapolis, Ind., with E. A. Stone as manager.

New Shock Absorber Manufactured—A new industry will shortly be started in Waynesboro, Pa., for the manufacture of the Landis shock absorber. F. F. Landis is the inventor of the new device.

Bus Line in Chile—A concession to operate motor buses has been granted by the Chilean government to Carlos Eastman, who will equip and conduct several lines between Santiago and its suburbs.

Smith on Western Trip—Paul Smith, recently appointed sales manager of the Lozier Motor Company, Detroit, Mich., recently left that city on a month's journey through the Central and far West.

Stearns Returns from Vacation—F. B. Stearns, president of the F. B. Stearns Co., Cleveland, O., manufacturer of

Stearns-Knight cars, returned recently from his midwinter vacation in Florida and Cuba.

Taxicab Rates Cut—Competition in taxicab service in Wilmington, Del., has resulted in cutting of rates, the Brandford Automobile Co. announcing a minimum of \$0.50 per mile, with \$0.25 for each additional person.

Mayer Carburetor Appoints Distributor—The Mayer Carburetor Co., Buffalo, N. Y., has appointed the Maydwell Company, Los Angeles, San Francisco, Cal., and Seattle, Wash., distributor of its product on the Pacific coast.



Breaking heavy wiregrass sod at the Richmond, Va., state fair with a Parker motor plow

Johnson Ford Manager—Fred Johnson has been appointed manager of the sales branch of the Ford Motor Company at Omaha, Neb.

Goodhart Advertising Manager—H. H. Goodhart has been appointed advertising manager of the Lippard-Stewart Motor Car Company, Buffalo, N. Y.

New Kerosene Carbureter—The Air Friction Carbureter Co., of Dayton, O., has placed on the market a carbureter designed for use with kerosene oil as fuel.

Dowse Promoted—R. P. Dowse has been appointed general sales representative in the Central District for the Goodyear Tire & Rubber Co., Akron, O. His headquarters will be in Detroit, Mich.

New Manager for Velie—C. R. Gardner has been made manager of the automobile department of the John Deere Plow Co., Omaha, Neb., and will have charge of the Velie line in the Omaha territory.

Miller's New Quarters—G. C. Miller, automobile dealer, is preparing to move into his new home at Main and Northampton streets. After removal, the concern, of which Mr. Miller now is manager, will be known as the Kane-Cadillac Motor Company.

Wolf with Henderson—The Henderson Motor Car Co., Indianapolis, Ind., announces the appointment of O. R. Wolf as factory representative and territory manager for the Cen-

tral States District. His headquarters will be in Chicago, Ill.

Bay State Lamp Bill Killed—Despite a campaign in favor of it, the Massachusetts tail light bill introduced by Representative Greenwood, was defeated by the House of Representatives recently. The bill made it unlawful for an automobile to be so equipped that the rear light could be extinguished from the driver's seat.

Havana Good Second-Hand Market—Within the last few months there has been an enormous increase in the volume of the export business in the used car market in Havana, Cuba. The popularity of American made cars is not appreciated by those who are ignorant of the remarkable frequency of shipments of used cars in that part of the world. The Latin-American countries are not slow to take advantage of improved facilities, especially when these facilities can be secured at a discount.

Wireless Now From Automobile—A new portable type of complete wireless telegraph station has been recently exhibited to the Government officials in Washington, D. C. The outfit, which includes two telescopic towers, is carried on a large automobile truck. It has living quarters for twelve men. The two towers can be raised to an altitude of 200 feet by the same motor which propels the automobile truck. At night illumination is supplied by a small electric plant operated by the truck motor. The signal officers of the army are studying the wireless auto-truck, and in the event it stands the tests several may be purchased for the army.

Automobile Incorporations of the Week

AUTOMOBILES AND PARTS

ALTOONA, PA.—Central Motor Car Co.; capital, \$10,000. Incorporators: C. C. Baker, Albert C. Akers, G. M. Smith.

BOSTON, MASS.—W. C. Bates Co.; capital, \$10,000; to do a general automobile business. Incorporators: William C. Bates, G. A. Kearsley, W. J. Munday.

BROOKLYN, N. Y.—Ackerman & Baird, Inc.; capital, \$10,000; to manufacture engines, motors, etc. Incorporators: Raymond P. Ackerman, Andrew D. Baird, Andrew D. Baird.

CAMDEN, N. J.—Par-Keel Wheel Co.; capital, \$100,000; to manufacture, buy and sell, and deal in automobiles. Incorporators: Frank S. Muzzey, F. Stanley Saurman, Frank A. Kuntz.

CHICAGO, ILL.—Rayfield Motor Sales Co. of Illinois; capital, \$41,000; to deal in automobiles and accessories. Incorporators: R. C. Wheeler, C. L. Cobb, C. Barnes.

LOCKPORT, N. Y.—Amper Electric Co. Incorporated; capital, \$25,000; to deal in autos, auto locks, and switches. Incorporators: Theodore D. Robinson, Ernest W. Jones, Charles L. Nichols.

MILWAUKEE, WIS.—Creek Motor Sales Co.; capital, \$25,000. Incorporators: R. A. Creek, Nora M. Creek, Willett M. Spooner.

MT. VERNON, N. Y.—Motor Truck Mfg. Corp.; capital, \$150,000. Incorporators: Arthur J. Albert, Henry Hichenbach and Louis Bertsch.

PROVIDENCE, R. I.—Lister, Smith & Walsh Co.; capital, \$50,000; to do a general automobile business. Incorporators: James J. Lister, Herman R. Smith, Wilbur R. Walsh.

PROVIDENCE, R. I.—Savoie Tire Co.; capital, \$10,000; to deal in automobile and other tires. Incorporators: Joseph Savoie, Edward C. Clines, Harry D. Reed.

RAVENNA, O.—Ravenna Motor-Truck Co.; capital, \$200,000. Incorporators: W. F. Traves, A. H. Knuth, H. Schwartz.

ROCHESTER, N. Y.—Carthage Auto Co., Inc.; capital, \$5,000. Incorporators: Frederick A. Kuhnert, Arthur W. Alderman and Chas. L. Pierce.

SARATOGA SPRINGS, N. Y.—Ross Ketchum Co., Inc.; capital, \$18,400; to deal in automobiles, motorcycles, bicycles, motor boats and motor vehicles. Incorporators: J. Arthur, P. Ketchum, Norman B. Ross, James W. Northrup.

THOMASVILLE, N. C.—Thomasville Motor Co.; capital, \$5,000. Incorporators: T. J. Finch, B. F. McCuister and Z. V. Crutchfield.

TRENTON, N. J.—Taxi Service Co.; capital, \$25,000; to do a general automobile business. Incorporators: H. W. Snook, F. J. Butter, C. H. Naylor.

WILMERDING, PA.—Valley Rapid Motor Co.; capital, \$5,000. Incorporators: John Genre, Dominick Genre, H. F. W. Rentzel.

WORCESTER, MASS.—Overland Winton Sales Co.; capital, \$10,000; to do a general automobile business. Incorporators: H. T. Pierpont, Geo. F. Daller, J. Clarke, Jr.

GARAGES AND ACCESSORIES

AMESBURY, MASS.—Walker, Wells Co., Inc.; capital, \$25,000; to manufacture automobile bodies. Incorporators: H. P. Wells, James H. Walker, H. Miller.

BANGOR, ME.—Penobscot Garage Co.; capital, \$10,000. Incorporators: Charles H. Shorey, Amos J. Shorey, G. D. Shorey.

BOSTON, MASS.—Arco Rubber Co.; capital, \$15,000; to deal in rubber goods, tires, etc. Incorporators: L. D. Apsley, H. G. Cressinger, F. E. Black.

BOSTON, MASS.—Peabody Square Garage Co.; capital, \$5,000. Incorporators: John T. Duke, J. J. O'Keefe, M. A. Duke.

BROOKLYN, N. Y.—Peerless Radiator & Auto Lamp Works, Inc.; capital, \$5,000; to deal in auto lamps, parts, supplies, etc. Incorporators: Max Stadien, Luis Schapiro, Bernard Wolfensohn.

BROOKLYN, N. Y.—Cumberland Garage, Inc.; capital, \$25,000; to deal in automobiles, etc. Incorporators: A. Wilmarth, W. L. Gray, M. F. Wilmarth.

BROOKLYN, N. Y.—National Auto-Radiator & Lamp Works, Inc.; capital, \$10,000. Incorporators: Jacob Samas, Julius Pasternack, Milton J. Gordon.

CAMDEN, N. J.—American Silencer Co.; capital, \$50,000; to manufacture devices for silencing automobiles. Incorporators: F. R. Mansell, Geo. H. B. Martin, S. C. Seymour.

CHARLESTOWN, W. VA.—Kanawha Garage Co.; capital, \$5,000; to conduct a garage for the hire of automobiles and other vehicles to the public. Incorporators: H. M. Bertollett, George Morrow, W. E. Waybright, J. H. Ford and Leroy Allebach.

CHICAGO, ILL.—Chicago Original Auto Polo Co.; capital, \$6,000; to operate places of amusement, and also deal in automobiles. Incorporators: Jos. R. Deahl, Frederick W. Moore, Marie C. Suhr.

CLEVELAND, O.—National Garage Co.; capital, \$20,000. Incorporators: R. D. Morgan, E. G. Nally.

COLUMBUS, O.—New Columbus Auto Co.; capital, \$30,000; to do a general repair business. Incorporators: Jesse I. Brown, Lillian Brown, Wm. E. McGannon, Chas. E. Dennis, Edson B. Dennis.

CLEVELAND, O.—Eaco Auto-Lock Sales Co.; capital, \$5,000. Incorporators: W. G. Wells, Ralph W. Fellows, Charles Pugh, M. P. Carrig, Stewart Hart.

EAST ORANGE, N. J.—Norwood Garage, Inc.; capital, \$10,000. Incorporators: Walter C. Jacobs, Dwight R. Davies, Louis Boehme.

FAR ROCKAWAY, N. Y.—Far Rockaway Motor Vehicle & Cab Owners Association, Inc.; capital, \$500. Incorporators: James Harris, Edward J. C. Kelly, Harry Traver.

HARTFORD, CONN.—Hartford Auto Pump & Supply Co.; capital, \$50,000. Incorporators: Henry F. Schwarb, Edward E. Tryon, Thos. Lockwood.

INDIANAPOLIS, IND.—Motor Starting Mfg. Co.; capital, \$40,000; to manufacture a motor starting device. Incorporators: W. J. Sylvester, Samuel Brundage, H. J. Herff.

INDIANAPOLIS, IND.—T. M. S. Mfg. Co.; capital, \$25,000; to manufacture a combination front fork and shock absorber. Incorporators: F. M. Strong, W. J. Gemmill, L. W. Mellette.

NEWARK, N. J.—Puncture Cure Sales Co.; capital, \$50,000; to deal in devices for repairing tires. Incorporators: Frances B. Stewart, Howard F. Kirk, Chas. H. Stewart.

NEW YORK, N. Y.—Star Taxi Cab Co., Inc.; capital, \$2,500. Incorporators: H. T. Silverman, Nathan Waxman, James B. Vaughney.

NEW YORK, N. Y.—Forty-seventh Street Taxi Cab Co., Inc.; capital, \$500. Incorporators: Thos. G. Corvan, James E. Corvan, Jerome P. Corvan.

NEW YORK, N. Y.—Auto Center Inc.; capital, \$25,000; to do a general garage business. Incorporators: E. W. Forrest, C. H. Fuller, B. C. Thomas.

NEW YORK CITY, N. Y.—Tioma Oil & Grease Co.; capital, \$50,000; to deal in greases, lubricating oils, etc. Incorporators: E. J. Forham, F. B. Knowlton, J. J. Harper.

NEW YORK, N. Y.—No-Shock Wheel Co.; capital, \$400,000; to deal in automobile wheels. Incorporators: J. W. Ebba, R. H. Waddell, A. A. Kelly.

PHILADELPHIA, PA.—Franco-American Safety Tire Co., of Philadelphia; capital, \$100,000; to deal in automobile tires. Incorporators: Emile LeFevre, Eugene Wolf, Armand Gallard.

RICHMOND, IND.—Sedgwick Mfg. Co.; capital, \$10,000; to manufacture the Sedgwick lifting jack for motor cars. Incorporators: James H. Judson, Richard Sedgwick, J. R. Sedgwick.

ROCHESTER, N. Y.—Zimbrich Taxicab Co., Inc.; capital, \$3,000. Incorporators: Fred Simmons, Alexander G. Wall, Herman J. Zimbrich.

ROCHESTER, N. Y.—Stein Auto Supply Co., Inc.; capital, \$3,000. Incorporators: Andrew E. Stein, Harry E. Pramer, Louise M. Stein.

ROCKAWAY BEACH, N. Y.—Seaside Garage Inc.; capital, \$5,000. Incorporators: Patrick H. Morrison, Anthony Hauser, Jennie Morrison and Louise Schilling.

SAVONA, N. Y.—Kirkham Aeroplane & Motor Co., Inc.; capital, \$100,000. Incorporators: Edwin H. Skinner, Chas. B. Kirkham, Stanley I. Vaughn.

YONKERS, N. Y.—Broadway Auto Supply Co., Inc.; capital, \$5,000. Incorporators: Frederick J. Snyder, Pauline A. Snyder, Bernard E. Reardon.

CHANGES OF CAPITAL AND NAME

DAYTON, O.—Air-Friction Carbureter Company; capital increased from \$20,000 to \$30,000.

TOLEDO, O.—Rapp Mfg. Co.; change of name to Toledo Spark Plug Mfg. Co.